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AMERICAN MACHINIST

A PRACTICAL JOURNAL OF MACHINE CONSTRUCTION.

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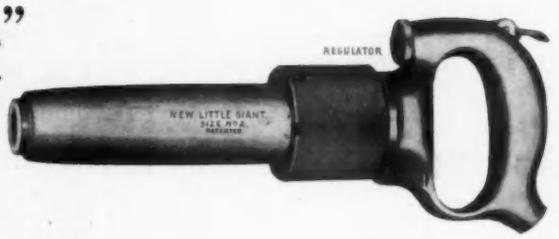
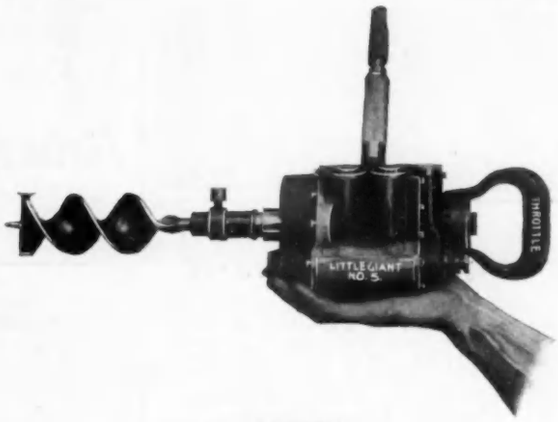
"Little Giant" Pneumatic Tools





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are everything that that good pneumatic tools should be, and are truly "Little Giants" in strength and efficiency.

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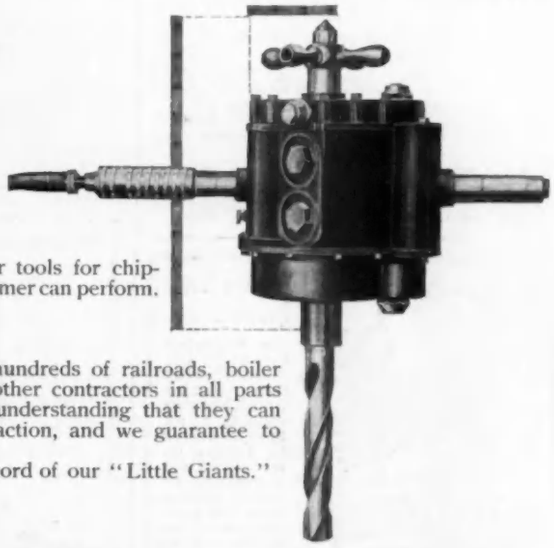

"Little Giant" Hammers

are made in every good kind and size, and are in every way superior tools for chipping, calking, beading, or any other service that any pneumatic hammer can perform.

"Little Giant" Pneumatic Tools

are the standard by which other pneumatic tools are judged, by hundreds of railroads, boiler shops, ship yards, foundries, architectural iron works, bridge and other contractors in all parts of the world. We send them anywhere, on trial, with the distinct understanding that they can be returned to us at our expense if they do not give perfect satisfaction, and we guarantee to keep them in repair for one year.

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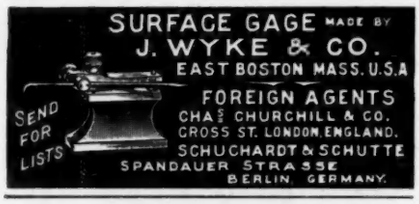

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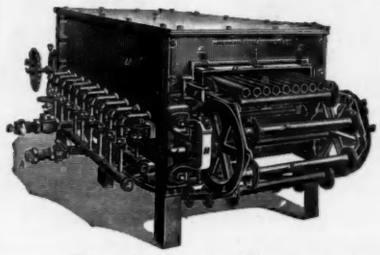

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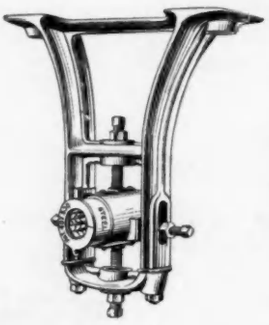

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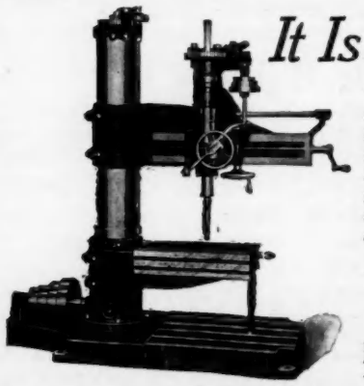

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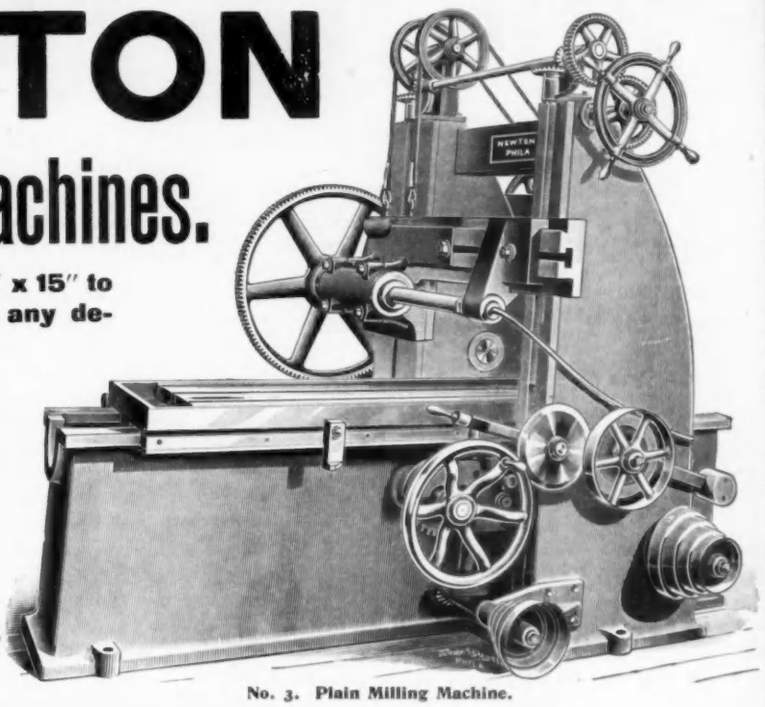

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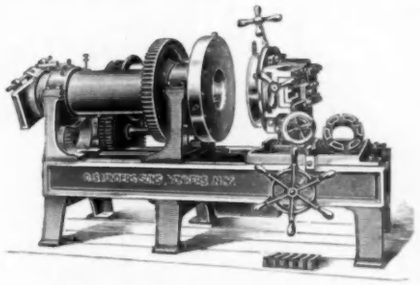

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AMERICAN MACHINIST

A PRACTICAL JOURNAL OF MACHINE CONSTRUCTION

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The Work That Goes Abroad.

The terms engineer and engineering have so many different meanings that they are almost meaningless. That is to say, unless one has some other way of arriving at what is meant by these terms in any particular case, the terms themselves convey no precise or definite meaning.

Men who are entirely without what is known as practical experience, who know nothing of shop work and have never designed a single working machine or structure of any kind often call themselves and are called by others engineers. Their knowledge of engineering is derived exclusively from study of engineering work that has been done by others. On the other hand, these are the men whose knowledge of engineering has been gained by close contact with the actual materials of engineering. They have comparatively little of the knowledge of engineering that is derived from books, but know how to efficiently carry on work in certain lines in which their training and experience have made them proficient. It is quite common to find a man belonging to one or the other of these classes denying most emphatically that those of the other are engineers at all. The one cannot see how a man who knows nothing of Rankine or of Releaux, of the calculus or of thermodynamics can claim to be an engineer; while the other is equally unable to see how a man who could not lay out or conduct a successful manufacturing plant or a department of such a plant can be an engineer.

This difference of opinion in regard to the proper use of the term, together with many other variant uses of it produces more or less confusion and misunderstanding, and is doing so now with regard to what is known abroad as "American competition." This successful and growing competition is said to be due to our superior "engineering," but that depends, it seems to us, upon what is and what is not to be classed as engineering.

For the present we shall use qualifying terms, and shall speak of academic and practical engineering, and we trust that our meaning will be sufficiently clear to avoid misunderstanding.

It would, we think, pay some of those who are discussing, more or less pompously, the question of American competition with British machinery builders and what the meaning and purport of this competition may be, if they would sit down and calmly consider what particular work it is that has been and is now doing most to enable us to win our way in foreign markets.

We have no desire to disparage the work of any class of men, but it is ridiculous to see American writers, who are almost purely academic engineers, nonchalantly assuming that it is the work of the class of engineers which they themselves represent that is winning laurels (and dollars) for us abroad, whereas it is really the work of a class of men often sneered at as "practical men" that is really doing most of this.

In the nature of the case no very accurate comparisons can be made, but who is there that can compare foreign with American academic engineering and say that ours is so much better than that which is found abroad as to account for our recent triumphs? Who is there that will say that our engineering is, on the whole, one whit better than is to be found abroad? Particular lines can be mentioned in which, perhaps, it is superior; but to offset these there are lines in which they are ahead of us, and the one particular thing in which we are concededly in advance is in our shop practice and in our shop devices, these being for the most part the work of men who would not think of calling themselves engineers, and who, along with their work, are almost entirely outside the ken of the academic engineers, and are even sometimes despised by them. In many cases where our purely engineering work has taken a position in advance of that of other countries it has been simply because our better shop practice has permitted or made practicable features of design that would have been utterly inadmissible with less advanced shop practice, or with the shop practice of any other country.

An ingenious American—a man perhaps wearing overalls or a denim apron, and having a far more intimate acquaintance with lathe-tools, files and chisels than with moduli of elasticity or radii of gyration, invents an improvement pertaining more or less strictly to his work, or perhaps devises a machine which does away with hand work or quadruples its efficiency—in other words, does what is constantly being done in American shops all over the land. If the machine or device itself is sold, his work becomes known more or less outside the shop in which he works; otherwise not. Afterward an academic engineer, who could not tell a good file from a poor one, applies mathematics and formulas and moduli and other things to this device or machine and tells the world all about how it works and why it works, and lo! the result of his labors on the machine goes into the literature of the profession as engineering work, while that of the creator of the machine is entirely obscured and lost sight of. What we want to specially call attention to is the fact that it is the creative work that is being done mostly in shops by men who are not generally recognized as engineers at all that is, more than any other work, spreading our name and fame abroad; and particularly does this apply to the machine-tool trade.

We would not detract from the credit due to anyone, but seek merely to call attention to the plain fact that credit is not being given in some quarters to the men whose work is most clearly and indisputably superior to the work with which it comes into contact abroad. It is this work, in our opinion, that is doing most

to advance our foreign trade, and it is essentially the art of the American tool maker; many of the systems of manufacturing now in use here and regarded as entirely new being, in fact, nothing more than the adaptations of methods that have been in use in the manufacture of small arms, sewing machines, etc., for many years.

It is a fact that practically no instruction in the tool maker's art is given in schools, and that most of the teachers in those schools hardly know what is meant by the term tool maker; yet, we repeat, it is the work of the tool maker more than that of any other class of men that has placed us in our pre-eminent position as a machinery using, making and exporting nation.

Meeting of the Junior Mechanical Engineers.

The second monthly meeting of the junior members of the American Society of Mechanical Engineers was held at the society house during the evening of November 7. The paper of the evening was on "Compound Locomotives," by Fred H. Colvin, associate editor of "Locomotive Engineering." The paper was both historical and descriptive, and was copiously illustrated with lantern slides, showing some early attempts at compounding and the distinctive features of the leading makes of American compound locomotives.

The attendance was good and the discussion interesting and instructive. It was participated in by several who knew whereof they spoke, and the testimony of all these was to the effect that while subject to limitations which must be recognized if success is to follow, nevertheless, when used under suitable conditions, the compound locomotive does save fuel to an extent which assures that it has come to stay. This saving of fuel ranges between 15 and 30 per cent., according as the conditions are more or less favorable. A difference between the two and four-cylinder compounds was stated to be that the latter were much more capable of extremely high speeds, owing to the greater freedom of the exhaust. A recent important improvement in the two-cylinder compounds, whose object is to remedy this defect, was stated to be a modification of the Allen valve, whereby the supplementary port is made to act as an exhaust port. The explanation of the superior economy of the compound appears to be essentially the same as that of the compound marine engine—namely, its adaptation to high pressures. Gain in economy from increased pressure appears to stop with the simple locomotive at about 170 pounds pressure.

The reason for the more rapid progress of the compound locomotive abroad than here was explained as due to several facts. First, the European engineer appears to have no fear of increased first cost, increased complication, or increased expense of repairs, and secondly, the practice in Europe is to give engineers their economical load instead of the largest load which they can pull. Passenger trainloads in France, for instance, were stated to be scarcely more than one-third of what they are with us.

While the early compound locomotives made in this country seem to have been successful as fuel savers, they were not satisfactory as operating machines. They were not sufficiently powerful to do the work required, and, until experience had been acquired, the proportions of the parts were not such as to insure against breakdowns. These defects have been removed as experience has accumulated, and the compounds of to-day were said to be satisfactory in the operating sense, and to entail no undue cost of repairs. The testimony on this latter point was somewhat conflicting, one or two speakers claiming the repair account to be less with compound than with simple machines, but the most that can be said positively is that, in this respect, the engines as now made are satisfactory.

At the conclusion Professor Hutton gave a graphic account of some of the trouble which he had experienced in endeavoring to operate the Vauclain compound at the Columbia University mechanical laboratory under cover.

Death of William H. Webb.

The death of William Henry Webb, the once eminent American shipbuilder, which occurred in this city on October 30, is an event of national importance, and one which we could not properly allow to pass without notice. He, in his day, contributed largely to the prestige of America among the nations, and to the preeminence of our merchant marine, and if in these latter days our shipping has not held its own it has been from causes to which he was not a contributor.

Mr. Webb was born in New York in 1816, soon after his father, Isaac Webb, had made a national reputation as a shipbuilder in the war of 1812. Young Webb was a born mathematician, and he acquired thoroughly the theory, as well as the art of the shipbuilder. At the age of twenty he built his first steamship, the Oxford, under sub-contract with his father. In 1840, soon after his father's death, he entered into partnership with Mr. Allen, who retired in 1843, and from that time Mr. Webb conducted the business alone. He built nearly two hundred ships, among which were the first steamer to run between New York and Savannah, the first for the New Orleans trade and the first for the Pacific Mail Company. He built the General Admiral for Russia, and the first ironclads ever built in the United States. Among the last of his work were the ram Dunderberg, later sold to France and renamed the Rochambeau, the Fall River steamers Bristol and Providence and the Pacific Mail steamer China.

Mr. Webb retired from business in 1873 with a large fortune. He then gave the best possible evidence of his continuing devotion to the cause of American shipbuilding and the shipbuilder by the founding of the Webb Home and Academy for Shipbuilders on Fordham Heights, New York city. This institution provides gratuitous support for aged, indigent or unfortunate men who have been engaged in the building of ships or their engines. The wives of such men also are provided for, there being accommodations for 400 persons. The institution furnishes also free and thorough instruction for young men in the art of the shipbuilder. Instead of leaving provision in his will for the founding of such an institution, he saw all the plans made, the building erected and equipped, and each department of it in full and successful operation in his lifetime, and he amply endowed it for future continued usefulness. The building was erected and equipped at a cost of over $200,000, while the endowment fund carries the total expenditure above $2,000,000. The institution is a notable object lesson in practical beneficence and a magnificent and lasting monument of a true and fruitful worker for America and humanity.

Considerable unrest seems to prevail among those concerned that the government in authorizing the construction of six new cruisers for our navy, bids for which have just been opened, did not call for a greater speed than 16½ knots. It is claimed that other navies are, and have been for some years past, constructing cruisers capable of steaming 19 and 20 knots, and it does appear singular that our government, especially in view of the demands for long voyages occasioned by the recent acquisition of new territory, should be content to have cruisers with so low a speed as that mentioned. It is worthy of note, however, that all the bids are under the cost limit set by Congress, and in several cases those bidding propose, with slight alteration of plans, to guarantee speeds of 18 and 19 knots. If this can be accomplished without prejudice to other requirements it would seem as though such offers should be accepted.

According to a recent copy of the "Automobile Annual" of France, more than 7,000 persons in Europe own automobiles. They are divided as follows: France, 5,606; Great Britain, 304; Germany, 268; Austro-Hungary, 90; Belgium, 90; Spain, 44; Italy, 111; Holland, 68, and Switzerland, 114. In France there are at present 619 manufacturers of automobiles.

Commercial Review.

NEW YORK, SATURDAY EVENING,
November 11, 1899.

AMERICAN TOOLS IN THE FAR EAST.

We recently mentioned a large shipment of machine tools that was being made from this country for Mr. F. W. Horne, of Japan. Subsequently we have obtained more detailed information upon that and allied matters.

Mr. Horne is a Chicago man, who some two years ago, went to Japan with a stock of American machinery, tools, etc., and opened an exhibit room in Yokohama. At present he has branches in Tokio, Kobe, Osaka, Kioto, Nagoya, Port Arthur, Tientsin, Shanghai, Hongkong and Canton, and is expecting to reach down to Manila and India. Mr. Horne represents about thirty large machine tool and other American companies. Among them are William Sellers & Co., Lidgerwood Manufacturing Company, American Tool Works Company, Gould & Eberhardt, Bickford Drill and Tool Company, G. A. Gray Company, Smith & Mills, W. F. & John Barnes, Norton Emery Wheel Company, L. S. Starrett Company, Wells Bros., J. A. Fay & Egan Company, A. L. Ide & Son, Atlas Engine Works and the Chicago Pneumatic Tool Company, two of whose plants he is now installing in Japan. Mr. Horne is now in this country, and is making his headquarters with W. J. Kingsland, exporter, 35 South William street, New York.

Mr. Horne holds a contract for the complete equipment of the marine machine shops at Port Arthur of the Chinese & Eastern Railroad, virtually a part of the Trans-Siberian. These shops appertain to a coasting traffic, in which are engaged eighteen steamers plying between Vladivostock, Port Arthur, Tientsin, Chefoo, Shanghai, New Chwang and Nagasaki, Japan. Of the equipment Mr. Horne shipped $50,000 worth from his stock in Yokohama and nearly all the remainder he has already ordered in this country. Some of it has gone forward, some of it is now going, and the shipments will be practically complete by about the first of next year. These tools have been purchased in great part from William Sellers & Co., the American Tool Works Company and the J. A. Fay & Egan Company.

Mr. Horne is fitting up a shop for the Kiushiu Railway in Japan, and for this purpose orders for about forty-eight tools, in addition to many that have been shipped, are now outstanding in America, deliveries to be made by January 1, and in some cases February 17 next. Among the machines are lathes, planers, milling machines, slotters, bolt cutters, etc. The manufacturers are William Sellers & Co., the American Tool Works Company, Diamond Machine Company and others.

Shipment was made to Japan for Mr. Horne, November 7, of lathes, Sellers hammers, etc., destined for the Uraga Dock Company.

MACHINISTS' SUPPLIES, ETC.

A complaint, which was chronic in the dull years, but which seems out of place in these times of prosperity, yet which is now beginning to be heard again, is the difficulty in making collections. That state of affairs is being experienced by so many of the trade that it forms quite a prominent new feature of the market. An explanation offered to account for it is that the large volume of business moving is too great for the available capital. This leads to a little retrospection. Back in 1896 it was contended by many that there was not enough money in the country to carry on business; to which the reply was made, and with considerable justice, that the supply of capital was ample, only that it was tied up because of lack of confidence. Business revival has since opened the treasure houses and a vast horde of funds has flowed out. But no amount could be sufficient if trade and new investments kept on increasing far enough; so perhaps we have reached the point where expanded industries have more than swallowed up the amount of capital available. Higher rates of interest demanded by the banks and resulting in a disposition on the part of debtors to hang up creditors' bills are also adduced as a cause for tight money, which seems to be but another aspect of the same explanation; unless, indeed, as has been charged, the banks are misrepresenting the scarcity of capital in order to raise rates.

Demand is excellent. Despite the dubious indications early in October, that month proved in several cases a record-breaker. Representative supply houses have pronounced its trade the best for any month of any year in their history. November is holding its own well. There may not be, upon the whole, quite the commotion that there was in the spring, but fall trade is highly creditable even to the year 1899.

Values are firm and in some lines have appreciated. The American file manufacturers put forth a new list, the first of this month, making an advance of about 15 per cent. over the one that went into effect June 1, and increasing the net price 5 to 10 per cent. over what it has been since the change in prices that was made about the end of summer. The mooted "trust" in the file trade has not yet come about.

The meeting of twist-drill makers in Cleveland, to which we referred some time ago, did not eventuate in the formation of a consolidation, but it seems to have been a move in that direction. An organic combination, while hardly to be pronounced a high probability, is regarded in twist-drill circles as more than a joke.

The new foundry of the General Electric Company at Schenectady, 500 feet long, which was opened about April 1, had not been occupied more than three months when it was found too small, and a 240-foot extension is now being built. The foundation for this is already laid, and the work of erection will proceed when the iron work arrives. There is more work on the floor of the Schenectady shops than ever before. The General Electric Company has now employed at the Schenectady plant 5 800 men; at Lynn, Mass., 3,700, and at Harrison, N. J., 1,000 or more, making over 10,000 in all.

The Philadelphia Forge Company, capital $50,000, has just been incorporated in Trenton, N. J. The directors are D. G. Gautier, W. C. Pearson, H. A. Bugie, C. H. Betts and R. McMichael. The general business office is 32 Cliff street, New York. A shop for the manufacture of steel forgings will be secured, probably in Philadelphia or Newark, N. J. Of the equipment has already been ordered a 6,000 and a 2,000-pound Sellers hammer and two Alfred Box cranes. More hammers would have been ordered if satisfactory deliveries on them could have been promised. The time for delivery of the equipment as purchased is four months. The company owns another hammer, and it has received bids on 150 horse-power of boilers.

The Skinner Chuck Company has announced for November 15 an advance of 15 per cent. in the price of planer chucks, on account of the increased cost of materials and labor. An advance on the higher grade of drill chucks goes into effect at the same time.

DAYTON REPORT—ACTIVITY AMONG GAS ENGINE AND OTHER MANUFACTURERS.

Dayton, Ohio, is fifty-six miles from Cincinnati, and is quite a large center for manufactures of various sorts. Information obtained from manufacturers in iron and steel lines, as well as those of furniture, carriages and other branches of wood work, bears a general tenor indicating very great improvement over last year and still more over conditions three years ago in the large number of orders received, the more men employed and the more or less night work done to fill orders as promptly as possible. As a facility for quick and cheap shipments, some of these manufacturers are fortunate in having tracks from the Big Four, Cincinnati, Hamilton & Dayton and Pennsylvania railroad lines running near their factories. The people of Dayton, through these three lines of road have easy communication with Cincinnati, as well as with Indianapolis, St. Louis and Chicago, to the West, and Columbus, Cleveland, Pittsburgh, Philadelphia and New York to the East. There are also two traction lines of cars connecting with Cincinnati by way of Hamilton. These conveniences create a large amount of business between these points, so that Cincinnati's relations with Dayton are very extensive.

Among the items of information ob-

tained from Dayton manufacturers, it is found that the National Cash Register Company report their 1899 business largely increased over 1898. Then they manufactured seventy-five registers a day, but they are now making 125 a day, an increase of over 60 per cent. They are erecting a new building, a steel structure, 360 by 60 feet, six stories high, and an addition to another building 350 by 50 feet, two stories high. They have put in a new $20,000 power plant for running machinery and furnishing electric light. The completion of these new buildings will require a larger amount of new machinery and furnish employment for several hundred more men and women. They have a force now of some 2,000, an increase of 25 per cent. over last year.

The Dayton Globe Iron Works Company finds in its business thus far an increase of 30 per cent. over 1898, about equally divided between home and export trade. They are employing 200 men on full time and fifty on night work. They have had, and are still having, a large demand for gas and gasoline engines, and many of 50 horse-power. Some three months ago they started in at making sugar machinery. They have several contracts for complete outfits for beet-sugar plants, and ere long will have to enlarge their buildings and employ many more men, increasing the number at least 75 per cent.

W. P. Callahan & Co. have found their business very largely increased over previous years, and are working 200 men in two forces, on day and night work. They have been doing this for some eighteen months. They have had all they could do in meeting the demands for the gas and gasoline engines. While they have had some orders for 100 horse-power, more are for 50 horse-power. Though they have sent some to Mexico, they are not seeking export trade, as their home trade keeps them fully employed. They have many orders for hydraulic machinery for making cotton-seed oil.

The Buckeye Iron & Brass Works find an increase in their business of 50 per cent. over last year. They have 300 men at work on full time and working nights till 9 P. M. some three-fourths of the time. Their export trade reaches all sections of foreign countries. They manufacture machinery for making cotton-seed oil, and have an order from Russia for a 100-ton mill—claimed to be the largest ever made. They have had a large demand from Mexico and the South. They manufacture tobacco machinery to make all grades of tobacco, and their trade in this line reaches all parts of the world.

The Stillwell-Bierce & Smith-Vaile Company's business has been very large for the ten months of this year, and in both of its branches the company has been working a large day force and an extra number of men on night work. The business of the Smith-Vaile branch is 50 per cent. better than that of the last two years, and they are well filled with orders for the balance of this year. The Stillwell-Bierce branch finds an increase of 25 per cent. over 1898. They have many men at work on two shifts, part day and part night. They have had a fair amount of export trade. They have a contract for transmitting machinery for the 75,000 horse-power electrical plant at Massena, N. Y. They have an order for 4,000 horse-power transmitting machinery for Sao Paulo, Brazil, to be employed in electric street railway and lighting plant purposes.

The Aetna Iron Works have been favored with a very large business thus far this year, an increase of 40 per cent. over 1898. They are working 120 men fifteen hours a day. Their demand for gas and gasoline engines is exceedingly good, and mainly for 50, 80 and 100 horse-power, though they have filled some orders for 125 horse-power, stated to be the largest single-cylinder engines of their kind made in the United States. Their business has so increased that by December they expect to be settled in a new building between Second and First streets, along the Pennsylvania Railroad, 300 by 175 feet, three stories high, where, with a large amount of new machinery and an increased force of workmen, they will be well prepared for meeting all demands made upon them.

The New Era Iron Works Company is one among Dayton manufacturers who have enjoyed a very fine business in their line of gas and gasoline engines, giving employment to quite a large number of men on full time. Their orders have come and still continue to come in good numbers, keeping them very busy. Their trade arrives from all sections of this country, with some from abroad, and from present appearances they feel that there is a good outlook for its continuance in the future months.

The Patterson Tool & Supply Company is doing quite an extensive business in machinery, machine tools and supplies. They find in their business an increase of 50 per cent. over last year. They have experienced some difficulty in getting manufacturers to fill their orders so that they could meet the demands made upon them. While they are dealers, they are also engaged in manufacturing jack-saws and other small tools. While not having a large force of men engaged at this time, they are looking forward to an increase in this part of the business which will enable them to employ more.

CHICAGO MACHINERY MARKET.

The almost universal complaint in electrical machinery circles is the extreme tardiness in getting orders filled. A number of manufacturers who have been carrying a considerable stock at Chicago are left without a motor here, and are, moreover, several months behind in their orders. To this stringent condition of trade there are one or two exceptions. For several months stocks have been dwindling, and that tendency continues. Little difficulty is experienced in selling goods that have been in the store for several years, and some business of that nature has been closed recently by wire. "What have you in stock?" is the inquiry, and to the answer comes the response, "Ship it at once." Buyers do not appreciate the situation, and are frequently disappointed in learning that the motor and generator are not lying in stock, waiting for the appearance of the new owner. Those manufacturers who make their own castings are at an advantage over the machinery builders who patronize the outside foundries, for the latter are buried in work, and lengthy delays occur in deliveries of frames and other essentials in construction. In wire and copper goods there is also more or less delay in making shipments, and accessory men are no better in the matter of promptitude. But radical competition is not wholly eliminated, and some builders are said to be as eager for closing contracts as at any time during the past year.

The Siemens & Halske Electric Company is adding to its pay rolls about 10 per cent. per week, and reports excellent trade.

Quotations.

NEW YORK, MONDAY,
November 13, 1899.

Iron—American Pig, tidewater delivery in 1900:—

Pennsylvania Irons:	
No. 1 X foundry	$24 65 @ $25 00
No. 2 X foundry	23 65 @ 24 00
No. 2 plain	22 90 @ 23 00
Alabama Irons:	
No. 1 foundry	23 25 @ 23 75
No. 2 foundry	22 25 @ 22 75
No. 3 foundry	21 50 @ 22 00
No. 1 soft	23 25 @ 23 75
No. 2 soft	22 25 @ 22 75
Foundry forge	20 25 @ 20 75

Bar Iron—Base sizes—Refined, mill price on dock, 2.35 @ 2.40c.; store price, 2.60c., upward; common from store, 2.50 @ 2.60c.

Tool Steel—Base sizes—Standard quality, 7 @ 8c.; extra grades, 12 @ 14c.; special grades, 16c. and upward.

Machinery Steel—Base sizes—Ordinary brands from store, 2.90 @ 3c. in small lots.

Cold Rolled Steel Shafting—Base sizes—From store, 4c. in small lots.

Copper—For Lake Superior ingot, 17c.; electrolytic, 16¾ @ 17c.; casting copper, 16⅝ @ 17c.

Pig Lead—Carloads, 4.62½ @ 4.65c.; wholesale lots, 4.60c.

Pig Tin—In 5 and 10-ton lots, f. o. b., New York, 26 @ 27c.

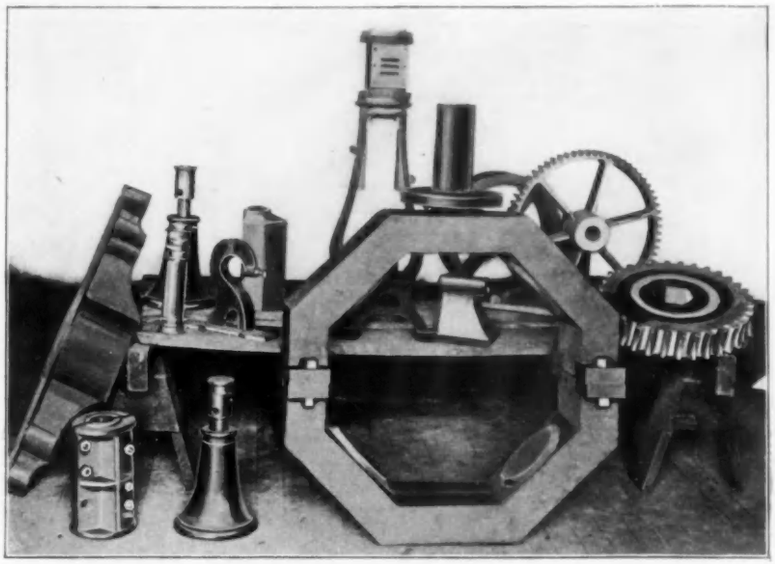
Spelter—Prime Western in carload lots, 4¾c.

Antimony—In cask lots or over, Cookson's, 10.95 @ 11.25c.; Hallett's, 9¾c.

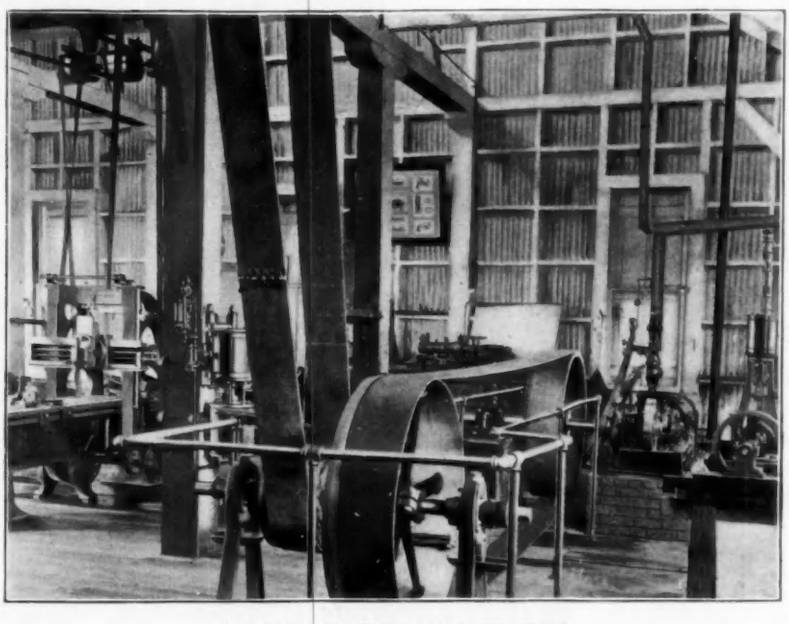
Lard Oil—Prime City, present make, ice-pressed, 44 @ 47c. in jobbing lots.

Commercial Work by Students of the Tuskegee Institute.

Most of our readers have heard of Booker T. Washington and of the Tuskegee Normal and Industrial Institute for the education of colored youth, of which he is the directing head. Few of them probably are aware that the institution possesses over 2,200 acres of land, with forty-two buildings—*constructed almost wholly by student labor*—that it has over a thousand students, that it gives instruction in twenty different industries, and that of many of these industries the product is sold in the open market, where it finds a ready sale, the proceeds going toward the support of the students. One of the trades taught is that of wagon making, and so satisfactory are the wagons made that the institute is said to be quite unable to supply the demand. Among the industries are a machine shop and foundry,



PARTS OF MACHINES TURNED OUT FROM FOUNDRY AND MACHINE SHOP, TUSKEGEE.



CORNER IN MACHINE SHOP, TUSKEGEE.

which have become the main reliance of the surrounding population for the repair of machinery of all kinds.

The writer of the following letter has charge of the machine shop, and in reply to a letter from us he has sent some additional photographs, showing the work done, as well as a first floor plan of the Trade Building, which are not referred to in the letter, but which need no explanation.

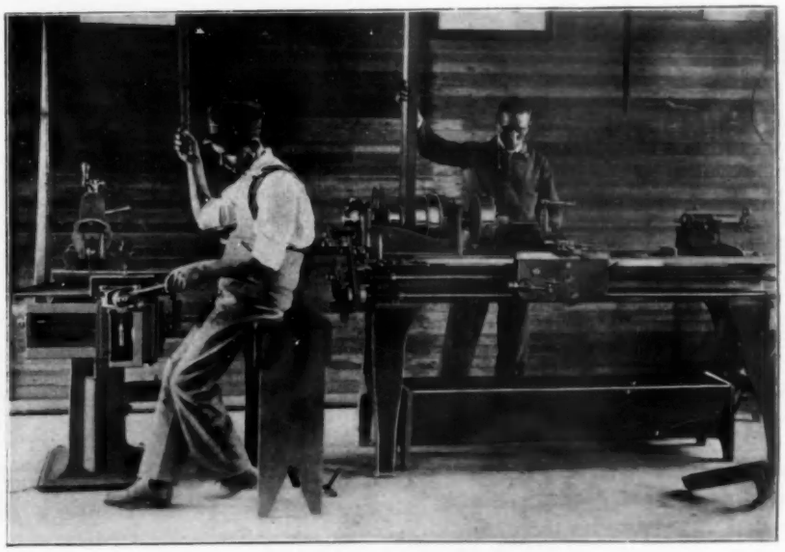
It will be obvious to all that this exhibit is in the highest degree creditable. How far the sale of products goes towards supporting the students we are not informed, and from that standpoint can make no comparisons, but if there is any Northern school conducted by white men which shows a more thorough grasp of the situation than this letter discloses we do not know of it.

In the matter of manufacturing or jig work in instruction shops, to some opinions of ours on which subject Mr. Thomas takes exception, we may say that our position is that such work should be done in order to teach such methods. At the same time, it is largely a matter of geography. In a manufacturing section our position seems to us to be unassailable, but in the South the conditions are different, and we admit that for his own work Mr. Thomas shows good judgment.

The following extract from a recent address by Mr. Washington, delivered at Huntsville, Ala., indicates the lines upon which the Tuskegee Institute was founded and is working:

"The colored man is beginning to learn that the bedrock upon which every individual rests his chances for success in life is securing in every manly way—never at the sacrifice of principle—the friendship, the confidence, the respect of his next-door neighbor in the little community in which he lives.

"Ignorance is many fold more costly



GETTING OUT PARTS OF A NEW MACHINE, TUSKEGEE.

NEW STEAM-HEATED AND ELECTRICALLY-LIGHTED CHAPEL AT TUSKEGEE, BUILT BY STUDENTS.

to taxpayers than intelligence. Every black youth that is given training of hand and strength of mind, so that he is able to grasp the full meaning and responsibility of life, so that he can go into some forest and turn the raw material into wagons and buggies, becomes a citizen who is able to add to the wealth of the State. Do you suggest that this cannot be done? I answer that it is being done every day at Tuskegee, and should be duplicated at a hundred places in every Southern State. This I take to be the white man's burden just now."

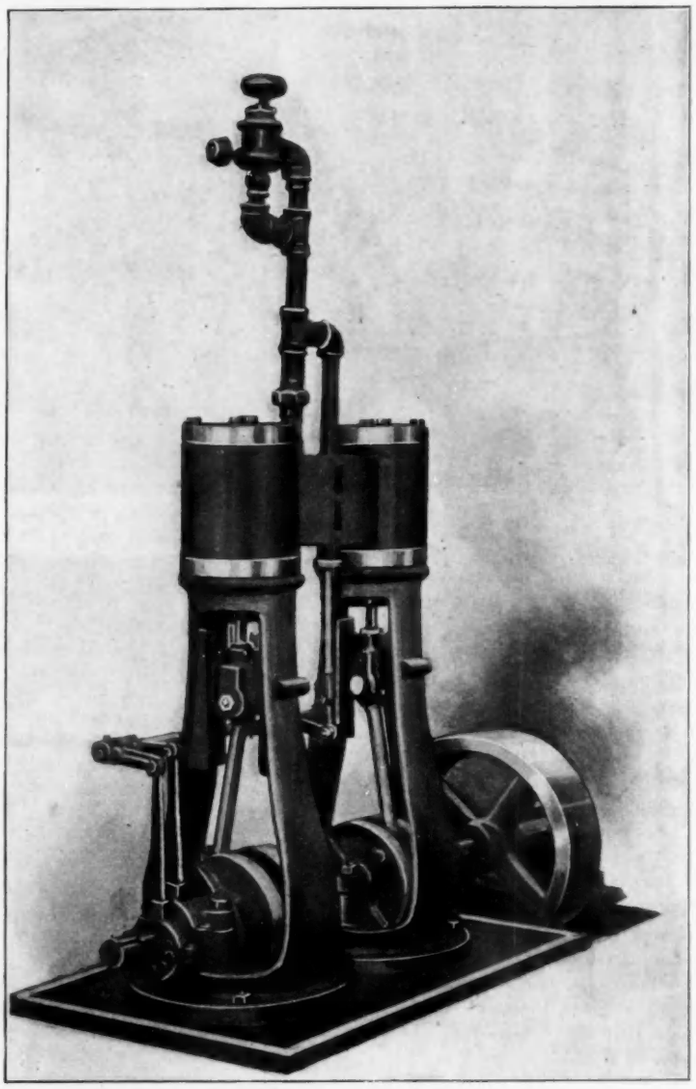
Mr. Thomas's letter follows:

Editor American Machinist:

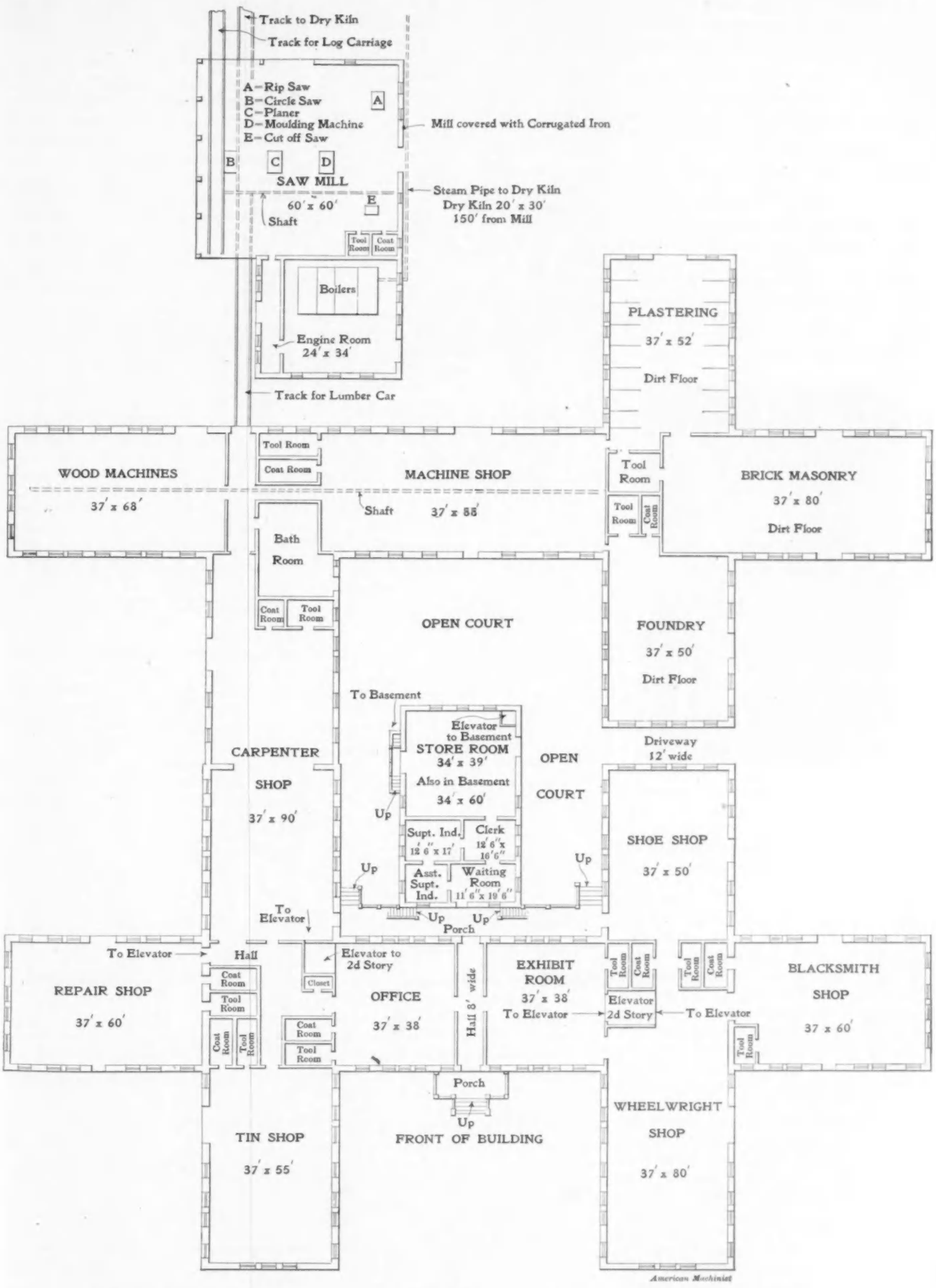
The article which appeared in your columns several weeks ago on the value of practical and profitable work in the college shop was very interesting to me, inasmuch as I have for five years been aiming more and more to get to this idea in connection with the theoretical and exercise plan. The exercise plan has some valuable points, but I have used it just as little as possible during the last several years, and then to make the students familiar with the machinery and, most of all, to teach them the dangers of machine tools, since the number of missing fingers on the hands of mechanics in these days would warrant that special instruction be given beginners in the matter of taking care of their hands. We do not have to go far to hear the work of the school roundly criticised for what are said to be poor methods and bad mechanical theory. but it is true that these shops, like other institutions, hold different degrees of merit and aim at various purposes. For instance, some of the shops connected with schools are conducted more for the demonstrating of academic problems in the effort to correlate the studies than for the mechanical training to be derived therefrom.

There is one class of school and shop work that should be denounced and censured, and this is to be found in the college which advertises to teach certain branches in mechanical work when it is lacking in equipment and proper teaching force to do so. I recently found a college with the course of electrical engineering in its catalog, and not a dynamo, switchboard or piece of valuable electric apparatus on its grounds.

The larger the institution the more opportunity there is for doing practical work in the machine shop, for with heating, power and electrical plants on the school grounds an endless amount of repair work must be done, and in our case the boys who are able to do this receive pay for it, or, what is as good, so much toward their board. The grinding of valves of all kinds, repairing of steam or water piping, keeping the engines adjusted, and such work, is given to my students the first year. We have a great amount of iron work coming from the wagon building and the architectural departments, and

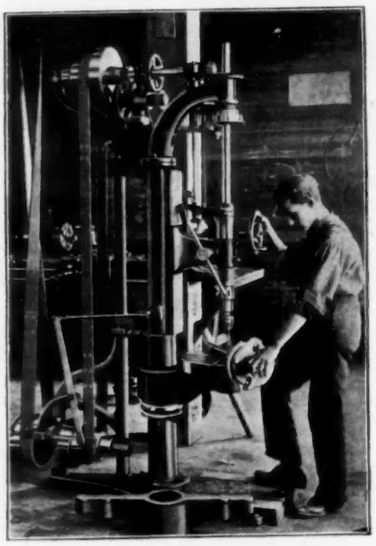


ENGINE BUILT FOR TUSKEGEE PRINTING OFFICE.



FIRST-FLOOR PLAN OF TRADE BUILDING FOR THE NORMAL AND INDUSTRIAL INSTITUTE, TUSKEGEE, ALA.

this must be laid off and drilled, and some of it filed to size and shape, and we sometimes use the drill press and shaper on this kind of work when required. I give the beginners a series of talks on the care of machines, and I feel repaid by the small number of nicks and scars on the machine tools. We are 25 miles from a foundry or machine shop, and we take orders for castings from the mill owners and planters for grate bars, engines, stoves, agricultural implements, etc., which the students mold in the foundry and finish in the machine shop. In one school term we made repairs on six steam engines and built a steam pump for use in teaching the younger boys the principles of the working of pumps. We were called to make a hydraulic test of a steam boiler last year, and the entire outfit, including the hydraulic pump for doing the work, was finished in the machine shop in seven hours.



WORKING ON NEW PARTS OF A WOOD-WORKING MACHINE, TUSKEGEE.

In our institute there are twenty different departments of industrial work, and most all of them use machinery. This machinery must be kept in good condition, and this means that my advanced students are kept busy on repairs on printing presses, metal working, agricultural, wood working and other machinery, and they receive a proper credit toward their tuition for such work. In one instance my students installed a heating plant in one of our buildings which contained 1,300 feet of piping, 22 cast iron radiators and a 30 horse-power boiler, and there were only two small leaks when steam was turned on.

In each case figures, drawings and records are kept of the jobs, so that reference may be made to them and the department be given credit at the end of the year for so much work done. Of course, great care must be taken that proper time be given to develop the students' minds, and they must not be rushed with this productive work, lest the educational feature be crowded out. We therefore have 45 minutes in the afternoon in which the classes are seated in the shops to take written work and to hear talks on the theoretical problems found in the trade. It is during this time that tests are made, drawings explained, mathematical problems given and worked, and this period is known as "theory hour." In one instance, when we were to construct a 100-light dynamo, we used six or eight of these "theory hour" periods to properly explain all of the work to the different classes.

Although I was formerly with shops using fine tools and jigs to produce work on the interchangeable plan, I have never used this idea in the school shop, believing it to be for the good of the student to lay off all work at the bench and size all work at the machine with tools made for the purpose. The steam engine built for our printing office, shown in one of the photographs, has seen three years of hard service, and is still being used daily, and we have also made one for another educational institution. I doubt if it would be advisable for a school shop to attempt to take an order for making such a thing as steam engine governors, as the firm using them would suffer in reputation, no doubt; and then it would call for jig and template work, which could not be used for the greatest good to those receiving instruction.

HARRY E. THOMAS.

Tuskegee, Ala.

Making Revolving Crane Beds—I.

BY JOSEPH HORNER.

The accompanying figures illustrate the revolving bed of a horizontal steam crane. These cranes are very popular in England. The commonest sizes range from 2 to 5 tons, but they are made up as high as 10 and 15 tons. They are mostly portable; the trucks are either of cast iron or they are built up with joist sections around a central casting. The revolving bed carries all the upper works—the engines, jib, gear, etc. The boiler (of the vertical type) stands upon a supply water tank which is bolted at the rear of the bed, and assists to balance the jib and load. The details of construction vary with different makers, and are modified by dimensions.

Fig. 1 shows a bed, in plan and elevation. The casting pivots on a pin fitting in the hole A. The four conical rollers, shown dotted in the plan, travel around a curb ring laid on top of the truck. *B B* are the recesses in which the feet of the jib fit easily. In this case the thrust of the jib is taken on pins which bridge these recesses, and which are in double shear. Sometimes, however, the jib feet rest

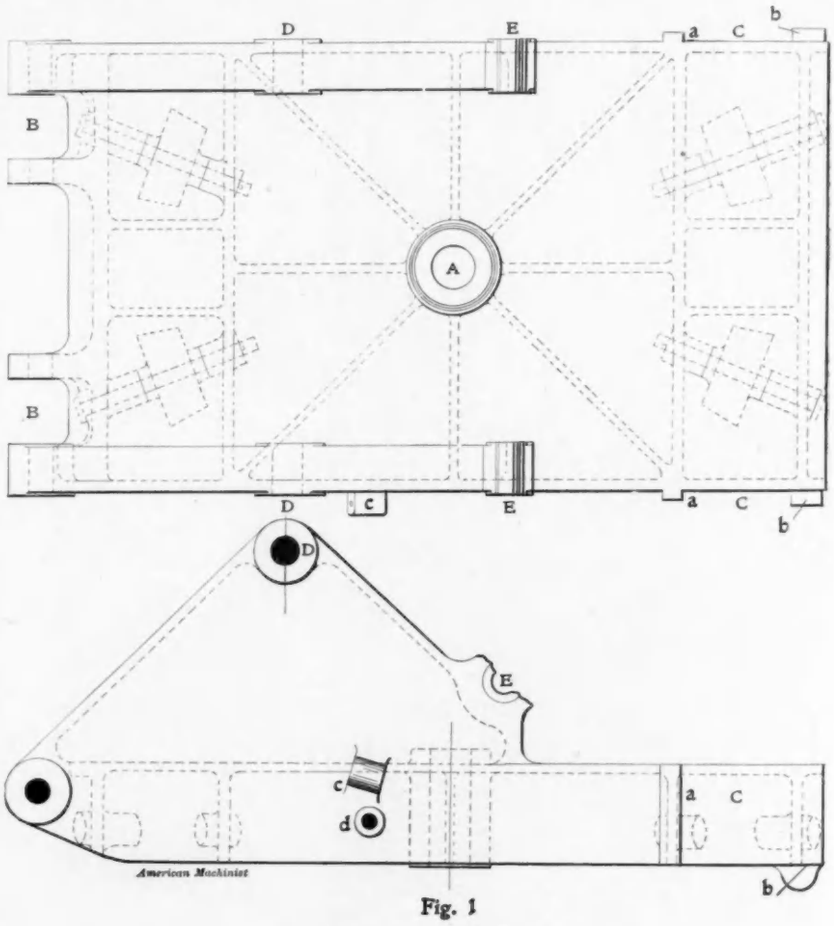


Fig. 1

REVOLVING BED FOR CRANE.

bodily in concave sockets in the casting. The pins pass through the holes cored in the lugs on each side of *B B*.

Against those faces of the castings marked *C C*, channel irons are bolted, and are extended backward to embrace the cast-iron tank, just now mentioned. The channels abut at *a a*, and rest on *b b*. In some instances the tanks are bolted di-

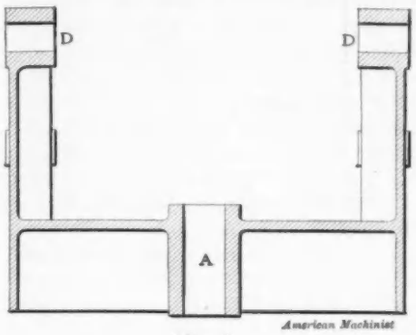


Fig. 2

CROSS SECTION OF BED.

rectly against the rear end of the casting, and channel irons are not used. The bearings *D D* receive the shaft of the hoisting drum, and *E E* that of the engine crank, the two being connected by gearing. The bosses *c d* form the fulcrum of the brake strap, the brake and drum-shaft wheel lying outside the casting.

This bed is seen in cross section in Fig. 2, the view being taken through the drum shaft and the center boss. This is a case in which the vertical cheeks are cored out on the *inner* faces, leaving a plane face of metal on the outside. Sometimes the practice is reversed, the coring being done on the outer face. An alternative method is that illustrated in Fig. 3, in which the uprights are cored out in the *boxed* fashion,

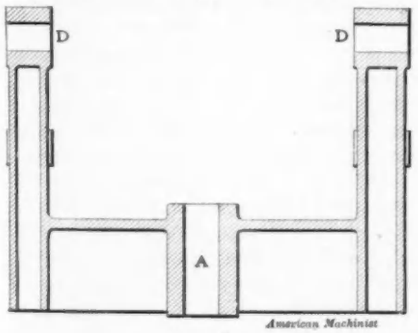


Fig. 3

ANOTHER STYLE OF CONSTRUCTION.

leaving the metal flush on both inner and outer faces.

These illustrate the more common ways of making horizontal beds, but there are numerous varieties, as follows: Looking at the plan in Fig. 1, the ribs next the ends are often cast at right angles with the center lines of the roller pins. This avoids the fitting of skew bosses for the pins. Rollers are not always cored, but are made parallel. This saves some slight expense, but is not correct practice; though on a large ring the amount of grinding and slipping due to absence of coring does not amount to much. Instead of casting the vertical cheeks along with the bed, they are frequently made as separate castings, and bolted on. This simplifies the molding, at the expense of extra machining.

In the heaviest cranes, the practice often is to cast the uprights and bolt them on channel irons, which then form the sides of the revolving bed, and between which three or more cross girders are bolted, much like those in vertical cranes. In some cases the lower edges of the bed, instead of being parallel, are tapered from the center towards front and back, giving a very rough approximation of a double parabolic outline. This is good practice, but it involves a little more work in molding.

These beds are molded by rolling over, and the vertical cheeks are poured downwards. The whole of the bottom portion of the bed is cored out. To put the ribs in the pattern, to deliver themselves, would involve an immense amount of liftering, and in green sand would be unsafe. If broad grids were used instead, with their rods coming into the top, then that method would involve quite as much trouble as core-making. The method of coring permits of a solid, substantial pattern being made by boxing up, while a pattern like the casting would be extremely flimsy and apt to go winding, and soon get out of repair.

As these castings are proportioned, they are, though of light scantlings, very stiff and strong; neither are they subject to any injurious shrinkage strains. I have seen dozens of these beds cast without ever a failure occurring, for there is no metal in excess anywhere, nor any abrupt changes of section.

In the next I propose to illustrate the pattern work and molding of Fig. 1.

A Plea for Honest Piece Work.*

BY R. T. SHEA.

In organizing this system one of the first things to remember is that all of the workmen combined in any shop or department are smarter than any one individual, be he foreman, superintendent or general manager, and that sharp practices or trying to take unfair advantage of the men in any way will react a hundred fold; absolute fairness is the first essential.

I have not much sympathy for the company that attempts to introduce piece work with the idea that the hair-splitting and unfair advantages taken of their men are soon forgotten by these men, like contracts written on sand to be obliterated by the first gentle breeze, and they will realize, probably, when failure is staring them in the face, that those unfair actions were written on the strongest kind of parchment with indelible ink, and that they will have to pay liberally for their folly. If one is letting the contract for a small barn, the total cost for labor of which will not exceed $10 or $20, and never expects to build another, or probably never again see the man who builds it, he can work on very different lines from the railroad company which is making contracts with its men to last for years, and whose very success or failure depends on the co-operation of these men. It should be remembered that in establishing a piece-work system it is not for a day or a week, but for years to come; it not only affects one shop or one railroad company, but it affects all; no speculation in prices should be indulged in, but every job should stand on its merits. As an illustration, if on two jobs one price is too high and the other too low, and if the same man does both, they will average up all right, but if for any reason the same man does not do both jobs, and they are given to two men, then the man who gets the low-price job will naturally suppose that the foreman is discriminating against him, and this will cause him to be dissatisfied. The man who gets the high-price job will realize that he is being paid more for his labor than it is worth, and if he does not say so he will know that it is unfair to the company. The rule should be to pay for each individual job what that job is worth, and not to depend upon one operation to help the other. There can be no hard or fast rule outlined for the setting of prices. This must be largely a matter of judgment of the foreman and piece-work inspectors in charge.

You cannot figure revolution of spindles and feed screws, cuts per second of tools, travel of platens or other fads to fix prices that will work in all shops, as it will be found that machines vary according to local conditions, and also men vary according to surroundings, and, as has been said recently in a paper before this club, that "Hobbies won't work except in the visions of those who ride them." Some advocate what is known as the fixed per cent. system. As an illustration, if a man is given a certain operation to do and he works the machine to what the foreman considers full capacity for, say, ten hours; this time is then reduced 10, 20 and 30 per cent. of whatever the agreed scale is, and his rate of pay is based on this reduced scale. If he earns, say, $2 per day, and it requires a day of ten hours to do the work, the piece-work price would then be made, if the 10-per-cent. scale was in use, $1.80.

I have often wondered if it ever occurred to the people who use this method, that the men very soon find out how they are being handled, and are governed accordingly; they may be able to make one or two prices at this rate, but from that time on they will find the men putting in enough time to easily overcome it. It would be far better in many cases to pay

* From a paper on "Piece Work in a Railroad Shop," read at the October Meeting of the Western Railway Club.

$2.10 or $2.20 instead of $1.80, making some inducement for the men to continue to get full capacity out of the machine and consider their interests as well as the company's, dividing in a measure the profit with them.

Our experience has been in establishing piece-work prices, that the conditions must be studied and good judgment used in each individual case.

In many cases we pay more for an operation on the piece-work scale than it would cost the company to do this same work, day work. If a man by a superhuman effort produces a large output of work in a given time, it is not fair to that man to expect that he can continue to do this day in and day out, and some allowance must be made. If, on the other hand, he does not do what is considered a fair way's work, then the piece-work prices must be based accordingly.

As soon as the men find out they are being treated in this manner, very little trouble will be experienced in arriving at the proper price to pay for the different operations.

The Engineer and the Indicator—Indicating Ice Machines.

BY W. H. WAKEMAN.

The first instance that I remember where an engineer received large pay for indicating an engine, occurred more than fifteen years ago, and it was in one of the cotton mills of the New England States. The agent became convinced that more coal was being used than was necessary, therefore he called an expert engineer, stated the case to him and inquired his price for applying the indicator, setting the engine valves and calculating the power used to operate the works. The engineer replied, "Fifty dollars per day, for whatever time it requires." This so enraged the agent that negotiations were suspended, for he declared that the services of no living man were worth such an exorbitant price. But as weeks passed away and the amount of coal burned showed that something was wrong, he again communicated with the engineer and asked for more advantageous terms. He then proposed to set the engine valves if the agent would pay him one-half of the cost of coal saved by the operation, for a period of six months. As there was no chance for loss under such a contract, it was closed at once. The job was done and the saving of coal commenced, but long before the time had expired the agent wanted to pay the original price asked, as he found it much the cheaper of the two propositions. The engineer would not agree to this proposition, as it had been scornfully rejected once; but a compromise was effected whereby he received much more than the first called for, although less than the second entitled him to.

This incident reminds us of the days when the indicator was regarded as a mysterious instrument, understood by a few only, and far beyond the reach of the average engineer. It appears as if we had now gone to the other extreme, for in many cases it costs steam users nothing to have their engines indicated. This is due to the fact that, as a rule, engineers are much more familiar with this instrument than they were twenty years ago, and also because hundreds of them are in use now where one was formerly. The natural consequence of this state of affairs is that the whole matter is considered of less value than when the service cost more, for in some cases steam users scarcely care to have their engines indicated, even if there is no charge.

In a certain case a steam user wanted some diagrams from his engine, and asked an expert engineer to take them for him. The request was complied with, although, on account of local conditions, it was somewhat difficult. After the job was finished, the steam user very politely thanked the engineer for his services, and dismissed the whole matter. One object of this article is to protest against a practice which so belittles the services of competent engineers. In other cases engineers have charged nominal fees which did not yield them good laborers' wages when all of the time involved was taken into consideration, and this also is unsatisfactory. I am free to admit that some engineers are not experts in the use of this instrument, which is one reason for their willingness to work at a low rate. They must secure practice somewhere, but their victims are not always benefited by the operation.

The plan adopted by some of the engineers' associations that own indicators and allow all of their members to use them, is an admirable one, as it gives them a chance to become familiar with its care and operation; but this does not necessarily make each one an expert. Where the engine in question is a small one, it does not pay to invest a large sum in expert service; therefore the engineer in charge of such a plant should learn enough of the instrument to enable him to take diagrams properly and to set the valves on his engine so as to secure the best results. Every engineer who has any pride concerning his standing among the craft will consider this a part of his regular duties, as he should count it a disgrace to have an outsider come into his engine room to do such work, for it is certainly no credit to him, especially when an indicator costs no more than a bicycle, and none is too poor to own one of them. I do not claim that it is necessary for him to learn all of the calculations that can be made in relation to the diagrams and what they show; but he should understand how to set valves properly by it, for there is no other way to do this important part of an engineer's work. If he does not care to exert himself to this extent, he should never complain because his employer does not take his advice concerning matters in connection with the plant, nor consult him when renewals, repairs and additions are to be made.

It is generally admitted that an indicator is a necessary adjunct for a steam plant, either for daily or weekly use, or else for proving the condition of the engine at longer and irregular intervals. It is not so generally admitted, however, that an indicator should be applied to the ammonia end of a compression ice machine in order to show the exact condition of its piston and valves, but as this class of machinery is coming into very general use the subject is worthy of special attention. The ammonia end of the machine is commonly called a pump, and as very few people ever think of indicating the water end of a pump, the ammonia cylinder is treated in the same way. This is a great mistake, for while it is of equal importance with the steam cylinder, so far as necessity for exact adjustment is concerned, it handles a gas that is far more liable to leak past valves and piston than water is, and, furthermore, the pressure at which the gas is used is greater than the steam pressure necessary to operate the machine, which increases the difficulty of successful and economical operation.

If the same indicator was proper for both steam and ammonia cylinders, it might be that it would be more generally used, but inasmuch as the moisture in steam will rust a steel indicator, and ammonia will destroy a brass one, it is necessary to use two kinds where durability is a consideration. It is quite possible for the expansion of metals to cause an ammonia valve to "hang up" for a portion of the time, destroying the useful effect of the machine, or, if the valve reaches its seat, it may not make a gas-tight joint, even though it may look all right when taken out and examined, or the piston may leak badly, thus allowing gas to pass from the delivery to the suction side, reducing the efficiency of the machine, and at the same time causing unnecessary wear.

There is a class of engineers to be found who claim to be superior to their fellows, because they do not need an indicator to tell them what is going on inside of their cylinders, and yet they give no evidence of ability to see clearly through cast iron, and without this accomplishment they need this instrument the same as less pretentious engineers do. In a certain establishment where refrigerating machinery is used the results were unsatisfactory, and a so-called investigation was begun. Two compression machines of a standard type were in use, and after all due deliberation it was decided that another one must be installed in order to provide the necessary amount of refrigeration. Now, the chief engineer in charge of this plant was not a novice in the business, neither was he one of those unappreciated, underpaid and con-

sequently discouraged, engineers whom we occasionally meet; but, on the contrary, he was well paid and highly appreciated; in fact, much more so than he deserved, judging by the results obtained. He did not decide the matter alone, but called in the chief of another plant of the same type, yet neither of them singly, nor both of them together, discovered the true cause of the trouble. While the firm was contemplating these expensive alterations which had been suggested, a combination of circumstances caused them to dismiss this engineer and hire another. The new man wanted an ammonia indicator, as he decided that the machines were not working to the best possible advantage; but, not having one, he did the next best thing. He took one of the machines down and found a very bad defect in it that the indicator would have disclosed the first time that a diagram was taken with it. I cannot claim that the indicator showed this defect, for it was not used, but if it had been applied early in the season the trouble would at once have been located and a remedy devised, while as it was the machinery was run in a decidedly wasteful manner during the entire summer, because there was no time to dismantle the whole apparatus and search for defects. After this change was made one machine did the work, except during very warm days, when the other was used to supply a small deficiency, but who could claim that they were in the best possible order even then? Certainly not the present engineer, for he claims that they do not work perfectly yet, but he needs an ammonia indicator to point out the exact location of the trouble, if there is any, and, if not, to show that everything is in perfect order. A good indicator for use in this work is rather expensive, but in this case it would have paid a higher rate of interest on the amount invested than any other money used by that concern, and they are getting rich fast, too.

I am of the opinion that the relation of this incident will fail to stir the proprietors of cold storage warehouses and ice-making plants to action as it should, for the simple reason that as each one reads it he will conclude that the moral applies to his neighbor only, when in reality it is meant for each and every man who owns, or is the engineer in charge of, one of these plants.

There are many points to be taken into consideration before a diagram from an ice machine can be pronounced perfect, or rather as indicating perfect conditions in the cylinder, and these I shall not attempt to explain here, as it would occupy too much space, but I wish to impress upon the minds of all readers the idea that a casual glance at such a diagram will not suffice to show up its weak points, for it must be studied carefully and several tests must be applied before all of its possible revelations are investigated, enabling the engineer to render a just decision.

Lost Time in British Shipyards.

Some time ago the shipbuilders on the Clyde and other Scottish building districts acceded to the demands of their men to pay wages weekly instead of fortnightly, as had been the custom. From all accounts the change has been anything but beneficial to either the workmen or their employers, and we give below extracts taken from our contemporary, "The Engineer," of London, which recently commented on the action taken and its results:

"The weekly pay system on the Clyde and in other Scottish building districts, after about four and a half months' trial, cannot be said to have benefited the men who agitated for it; and it has certainly proved, so far, to be even a greater source of loss and annoyance to the employers than even the most pessimistic of them anticipated. Men who previously lost one and often two days' work after their fortnightly 'burst' are now found, as a rule, to be losing the same amount of valuable working time after each weekly pay. . . One firm, the Grangemouth Dockyard Company, has already felt so aggrieved at the flagrant squandering of working time that it, some little time ago, issued the following notice: 'After this week we intend to return to fortnightly pays, owing to the adverse circumstances resulting from the introduction of weekly pays, both to men and employers. We are sure that the men will be of the same opinion as ourselves—that the weekly pays have been no benefit. Quite a number of workmen have expressed themselves that the loss of time since the introduction of the weekly pays has been so great that they are willing to revert to the old system.' Following upon the issue of this notice a men's meeting was called to protest against the proposed change, and the manager, who was present, agreed to abide by the vote of the majority of those present. All present declared themselves in favor of weekly pay! The Grangemouth Dockyard Company will, therefore, probably have to bear its yoke like others; but its action, all the same, may have done something towards bringing its own and other workmen to see the insane folly of making a curse of what was intended to be, at least, a benefit. . . . On this and kindred points some significant references were made by the chairman of the Palmer Shipbuilding & Iron Company, in the course of his speech at the annual business meeting of that company recently. He is reported to have said that, having looked into the figures, the directors found that in the shipyard the men were actually losing on an average 28 per cent. of the time they might work. They were, however, not so badly off in this respect as other firms, there being cases in which as much as 40 per cent. was wasted. The Clyde seemed much in the same position as the Tyne, as he had been told that 30 per cent., on the average, was being lost there. It was a very serious state of things for this country that working men—many of them of the highest skill and intelligence—should be so reckless with their resources. Platers could earn 25s. a day by piecework; riveters could earn 15s. a day, and some other classes of workmen about a pound a day. Yet such men deliberately wasted 40s. a week and more by declining to earn more than a certain fixed income."

Reasonable Use of a Power Plant.

An adjoining property owner in New York city sued an electrical company for damage to his building resulting from the operation of a power plant by the defendant, and asked an injunction. Small damages were awarded, but the injunction was denied, Justice Russell saying in his decision:

"It will not answer to use the discretionary power of injunction to stop a large industry of public utility, unless the occasion requires such extreme relief. It has a right to use its plant for effective generation of electricity, with the reliance that adjacent buildings are fairly protected in construction and stability from harm on account of reasonable use, and are tenanted by individuals of ordinary nerve-hardihood. It may, within the lines of such reasonable use, advance its enterprise according to increase of opportunity and invention, and is not compelled to remain stationary solely on account of adjoining buildings, provided the boundary of reasonable use is not overstepped. A tenant has the reasonable right to be satisfied with his location, and renew his lease from year to year. But he must have in view the burdens which contiguity to machinery must bear to the tenancy, present and prospective, of business enterprises in that locality. Deliberate choice to stay bears strongly on his perception of the reality and magnitude of the evils of his environment. Adjusting the rights of the parties, any restraint upon the defendant must be against excessive exercise of its right to generate electrical light and power, and not against its customary use."

This seems to be strictly in accordance with common sense at any rate, and if it is good law as well ought to save the owners of power plant from considerable annoyance and from being unreasonably hampered.

A new record in the building of warships has been made at the Devonport (England) dockyards. The first-class battleship "Bulwark," of the most formidable class in the British navy, was ready for launching in seven months after work was begun on her. In that time over 5,500 tons of steel were built into the ship. She is 400 feet long, 75 feet beam, displaces 15,000 tons, and will have a speed of 18 knots.

Letters from Practical Men

"The Salary Expected."

Editor American Machinist:

I am always interested in your "Help Wanted" column, and I read it when I don't always read everything else. I am a fellow always occupied, so that I don't look over these ads. altogether from necessity, but there's no telling how soon I may strike my ideal job that I've been looking for all my life and am still expecting, the one particular job that will fit me all over, as I suppose few jobs do fit a fellow. The "Help Wanted" ads. are in these days of greater interest than usual, and for at least two reasons. One is that there are more of them, and the other is that they read more as if they meant business than they do sometimes. The most telling indication of the urgent business intent is in the fact that so many advertisers forget in these times to tell the applicant to state what salary he expects. When I see that in an ad. I know that the job I am looking for is not there. The way things go, I wouldn't venture to put my price up where it ought to be; but wherever I put it, some other fellow would cut under me, and he would get the job, and I would lose my postage, my stationery and my time, and have my feelings strained in looking for a long time for the answer that never came. It is a very unsatisfactory experience at the best, trying to secure a position by answering advertisements, and when in addition to giving your own inventory of your charms, your own story of what you have done and where you have been, and your own idea of the slickness with which you can run things in the new place, you are also challenged to state in dollars and cents how cheap you are willing to sell yourself, it puts a strain on that, taken altogether, is more than some fellows want to stand.

When a shop or factory proprietor wants a well-qualified man to fill a responsible position, he should make every effort to find him, adopt all means available to inform himself as to the man's qualifications, and use his best judgment as to the probabilities of his fitting into the position in view. That is all right, but until these qualifications and probabilities are fully determined, the question of salary should not be suggested or considered. To pick the best, there should be as many as possible of the best to pick from, and nothing will more surely repel the best and invite the worst candidates than the wages suggestion. It is a terrible slump when a man tells in his ad. that he wants a real high-toned fellow, away up in every detail, to take hold and run things as they ought to be run, and then comes down and says that applicants must state the salary expected, which means, of course, that a difference of 25 cents a day can easily defeat ten times that value in qualifications. It's well enough to say that the seller of labor, mental or physical, as well as the seller of anything else, should be the one to set the price; but we all know that is not the way things are done. If we had our own say about what we were to work for, we would not so often feel so much like kicking. The best business men first find the best help they can, and then they make the best bargain about salary after, but the salary is a very minor consideration if the best ability is earnestly desired. Whatever is necessary to secure the man will be paid; so that, if it has to be paid anyway, what is the use of hampering the preliminary negotiations with it? There is not the slightest danger that the advertisee will be able to overreach the advertiser in these transactions.

There is, however, something a little worse than this trying to get fellows to commit themselves to abnormally low figures, and that is, to actually offer a figure lower than any respectable fellow would ever think of suggesting. In a recent issue there is wanted in a big city in England a works foreman or superintendent, experienced in a special line of work, able to originate a system of gages, jigs and special tools and to efficiently control about eighty hands. This is said to be a splendid opening for a good, energetic, experienced man, and the "salary" is £3 10s. ($17.50) per week "and commission." There is no hint as to what the commission may amount to, and it may be little or less. The figure offered is less than many good machinists are now earning here by the day, and lots of them by piece-work or premium arrangements are earning considerably more than that. It is very certain that the ad. must defeat itself. No "good, energetic and experienced" American man, capable of the entire mechanical direction of the establishment indicated, is ever going to make application for the job when he sees the figures. It is quite likely there will be applicants, and some fellow may go over and try to rattle around in the place that he can't fill, and when it gets to be time to bounce him the proprietors may fire a parting shot at American mechanics in general, when really only themselves are to blame, and when they cannot possibly have had any opportunity of sampling a first-class American at all.

We have samples of the same kind of thing nearer home. In the "American Machinist," October 12, there are three or four interesting jobs offered. The State of New York advertises a competitive examination to fill several positions. An examiner is wanted for the State Civil Service Commission, "requiring a knowledge of steam, electrical and mechanical engineering," with the munificent salary of $1,200 to $1,400 per year. Then there is a foreman of furniture finishing in the State Prison wanted at $2.50 per day, and a "master of handicraft" in the State School for the Blind at $50 per month and maintenance. The street sweepers of the city of New York get $2 per day of eight hours. Possibly one of them might be induced to apply for the latter position. A little better, but not much, is the advertisement for a "machinist foreman" for one of the State colleges, "foundry experience desirable," where there are 400 students and thirty apprentices and "machinery and scientific apparatus" is built, and the salary is $900 per year. These people either don't know what they want or they don't know the cost and value of what they want, and they are no more likely than anyone else to get more than their money's worth.

TECUMSEH SWIFT.

Balanced Hoists and Elevators.

Editor American Machinist:

The excellent letter from J. E. Johnson, Jr., about the tail rope system of balancing hoisting engines still leaves something to be said. Why did he not carry his letter a few steps further? The tail rope (or, better, chain) system has been in use a long time in America, and any large office building in our cities will show an example of it applied to the elevator systems. I have said above, better chain than rope, as an ordinary chain of equal weight per lineal foot with the hoisting cables will perform the function of a cable counterweight as well as a cable, and it requires no idler sheave, weight, etc., at the bottom of the shaft. Also if more than one hoisting rope is used, the chain may be made to equal in weight per lineal, foot the combined weight of the several ropes per lineal foot. One end of the chain should be anchored to the bottom of the cage. The other end may be anchored a few feet above the middle point of the shaft. This will serve to keep a constant torque upon the engine during either up or down trip, which has been found sufficient for hydraulic and other lifts, but it does not relieve the engine of the duty of lifting the cables additional to cage and load. For a steam hoisting engine the end of the chain may be fastened by a clevis to a single rope winding on the back of the drum, thus completely counterweighting the weight of the hoisting ropes, whether one or several, and leaving the engine to take care of the cage and load. A further refinement of the above has been used in connection with electric hoists, where economical considerations have dictated the designing of the electric engine as close in capacity to the requirements as possible. It consists in hanging a counterweight on the cable leading from the back of the drum, which counterweight shall weigh half as much as the total weight of cage and load. The engine then can be designed to lift but half of the required load constantly, instead of lifting the full load half the time and running idle half

the time. Suppose we have a lift 100 feet high, the weight of cage and load 10,000 pounds, making twenty single or up trips and forty complete or round trips per hour. Since the unweighted engine lifts 10,000 pounds each up trip and runs idle each down trip, the work performed per hour in foot pounds is 10,000 × 100 × 20 = 20,000,000 foot pounds; deducting the time the engine runs idle makes the actual performance 20,000,000 foot pounds in 30 minutes, or 40,000,000 foot pounds per working hour. The counterweighted engine lifts but 5,000 pounds each up trip, the counterweight lifting the remaining 5,000 pounds. On the down trip, however, the engine has to lift a 5,000-pound counterweight. Thus, the counterweighted engine, lifting 5,000 pounds on both up and down trips, performs 5 000 × 100 × 40 = 20,000,000 foot pounds per working hour, and exactly the same as the unweighted engine per elapsed hour. Since the single trip would occupy a minute and a half and a round trip three minutes, the unweighted engine would be called upon to perform 1,000,000 foot pounds in a minute and a half, while the counterweighted engine would be given three minutes to perform the same work. C. F. BLAKE.

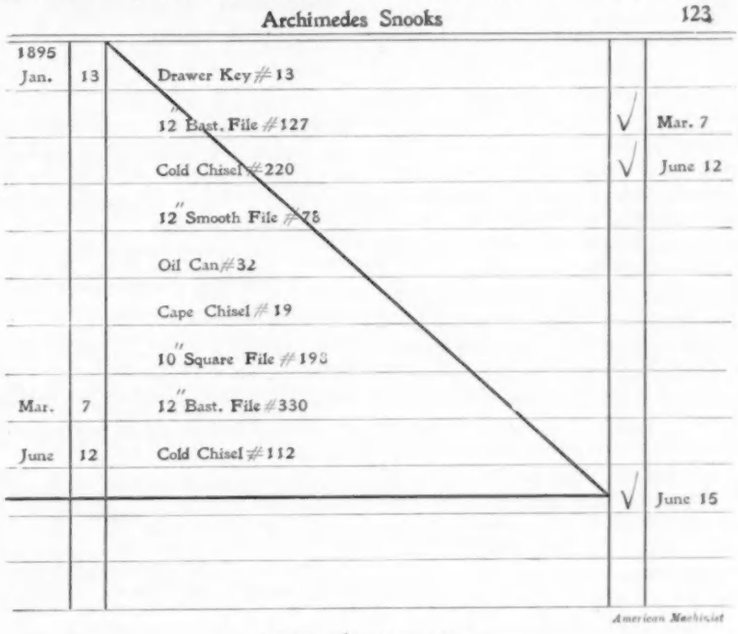
[The chain counterweight described in the first part of our correspondent's letter is not the equivalent of the tail rope described by Mr. Johnson, although its function is the same. The chain is applied to each elevator, which runs independently of the others. The tail rope is applied to a pair of balanced cages, one of which ascends while the other descends. Both systems, however, insure uniform effort by the motor at all positions of the hoist in the shaft, the load being constant. The counterweighted drum elevator is, broadly, the equivalent of the balanced hoist, the counterweight, however, hoisting no passengers, while, with the balanced hoist, both cages perform useful work. The last arrangement described is not the equivalent of either chain or tail rope, as it does not equalize the weight of the rope at different positions of the elevator in the shaft. The mine hoist designer has an advantage in conditions over the elevator designer, as the load to be handled by the mine hoist is known and fixed throughout the hoist, while with the elevator it is unknown and variable, both for different trips and for different parts of the same trip, and the average only can be assumed and balanced.—Ed.]

Some Features of a Chicago Tool Room.

Editor American Machinist:

Several schemes which I introduced into the tool-room of a shop building a wide range of machinery may interest the readers of the "American Machinist." The workmen's checks were kept on small brass screw hooks on a check board, and the workmen's names and numbers were written in a double slate. An intelligent youth attended the tool window and ground the twist drills, reamers, etc. The tool-room contained probably 3,500 tools, and had two or three bench vises with locked drawers, an 18-inch lathe, a milling machine, a cutter and reamer grinder, a twist drill grinder, a speed lathe, a sensitive drill and a power hack saw. Two or three machinists and the youth constituted the tool-room force.

All tools taken from this room had to be returned or rechecked within three days. For checking the date on which tools were taken oblong iron checks were cut from ½-inch band iron and marked, probably 100 with each one of the figures 1, 2 and 3. These were placed in three numbered pockets just below the checkboard and close to the tool window. When a tool was taken on Monday or Thursday one of these checks with the figure 1 was hung with the workman's check in place of the



WORKMAN'S TOOL RECORD.

tool. For Tuesday and Friday the figure 2, and for Wednesday and Saturday the figure 3 were used. The tool boy's first work each morning was to look carefully over all the sets and making a note of all tools which had been kept the time limit, look them up in the shop, and either have them returned, or if they were still in use recheck them by placing a second date check of the same number over the first one. Thus a tool which had been given out Tuesday and kept a week would have two number 2 date checks hanging over the workman's check. A request for longer use than a week, which sometimes occurred, was mentioned to the foreman, whose office adjoined the tool-room with a weighted window between. One date check was removed, and the tool could be kept another week by rechecking. The rule, typewritten and varnished over, was posted on the tool-window casing that "All tools must be returned in good condition as soon as possible after using, and all tools must be returned or accounted for within three days." When the rule was first posted it was at once observed by the better class of men. Several careless and shiftless workmen, for whom the rule was specially intended, kept their tools up to the time limit, and then told the tool boy when he called for their return that his memory was at fault, the time hadn't expired yet. Their eyes opened on learning that his memory was in the form of a wrought-iron date check, and they returned their tools and reformed their habits. Sometimes, before the introduction of the dating system, a man would lose or break a tool and simply say nothing about it. Its absence from its place might be unnoticed until another workman needed it, perhaps several weeks later. 'I have known a driller to break a drill and throw the pieces in a corner, and when the tool boy called for it, perhaps a fortnight later, for another workman to use, insist that he had returned it long ago. Having no date record, the boy was then at a disadvantage. Another driller took as many drills as he had checks for and kept them all for a number of weeks, returning none except when other men needed them and the tool boy came after them.

The date check system put a stop to these troubles. Each morning the tool boy, if any tools were lost or broken, made a memorandum of the date, the workman and the tool lost or broken and placed it on the foreman's desk. Noting and filing these slips, I thus knew absolutely the record of every workman. The value of this system was great in saving tools, but especially in saving workmen's time by having the tools always in place and ready for use.

In this shop machine hands were fur-

nished a monkey wrench, an oil can and perhaps one or two files. Vise hands were furnished a wrench, oil can, flat chisel, ⅜-inch cape chisel and several files, suited to their work, and a locked drawer, to which the foreman kept a duplicate key. All files were stamped on the tangs with consecutive numbers. All cold chisels, cape chisels or other shapes of chisels were stamped with consecutive numbers. Oil cans had consecutive numbers scribed on the bottoms. Monkey wrenches and the hammers which were occasionally given out to helpers were also stamped with consecutive numbers, beginning at 1 for each kind of tool. The tool boy kept a tool account book in pencil, in which all these tools were charged to the workmen. When a workman left the company's service he was expected to return all tools charged to him before receiving his pay. A page of the account book looked as shown. The book was paged and indexed, so that the workman's account could be easily found. It will be seen by this specimen page that A. Snooks got a locked drawer, No. 13, and an outfit of tools on January 13, 1895, that he exchanged his 12-inch file on March 7 for a new one, and on June 12 returned his chisel and received another, and when he quit, on June 15, he returned all his tools and his account was closed. When Jerry McGinty was fired for general worthlessness, he hadn't taken care of his tools, and when reminded that he'd have to produce them he merely scraped up an armful of any old tools and brought them to the tool-room, saying, "There ye are." The tool boy, comparing them with his account, found that only one or two of them were the numbers charged to Jerry, and that worthy was forced to hunt up the tools he hadn't taken care of. One or two occurrences of this kind soon educated the men to take care of the tools charged to them. S A . WORCESTER.

Springfield, Ohio.

Turning Tool for Automatic Screw Machine.

Editor American Machinist:

I have in my shop an automatic machine for small screws and differently formed pieces. At first when making formed pieces I used turned forming tools, as shown in Fig. 1. I always had trouble with these tools, as I was obliged to sharpen them every two or three hours. During this time, of course, the machine was idle, which limited its capacity. The round tools I find have not enough clearance, and the pressure is sufficient to make the pieces come out uneven. I favor a tool-holder as in Fig. 2. This form of tool is not turned, but planed in a shaper and then smoothly finished. This tool is held with a clamping screw, and Fig. 3 shows it complete. With this tool I can work ten hours, and on a trial have used it fifteen hours before sharpening was necessary. The automatic screw machine has a ¾-inch capacity, and makes, with tool Fig. 1, 2,500 pieces per week, while with tool Fig. 2 4,000 similar pieces are made per week. The making and finishing of these tools is very easy, and after sharpening them they are more easily inserted than the round ones. As a good many automatic screw machines are used

FIG. 1. FIG. 2. FIG. 3.

FORMING TOOL.

in the United States, I ask that you place my suggestion before your readers, and hope that it may be of interest to them.

ROBERT WAGNER.

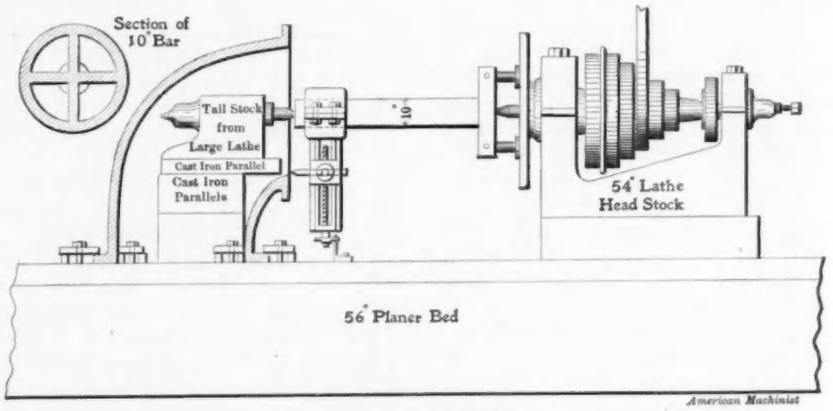
Chemnitz, Saxony.

Facing Large Elbows.

Editor American Machinist:

Sometimes in the jobbing shop they have to do very large work with very small tools, and there is often good money in these big-little jobs, as we might call them, as it would cost so much and there would be so much time wasted in shipment to a large shop that it pays to do some thinking when these kind of crooks present themselves. I remember one that I had a number of years since, and it was a sticker for a time; but we got around it, and with very slight cost. The job was a lot of 60-inch ells, and they had to be faced, and must be square. The largest lathe in the shop was 54 inches, so it was out of the question to face the ells in this on an angle plate, as we would have done a short ell, say 6 or 8 inches. We did it *with* the 54-inch lathe, if not *in* it. But we had to combine a 56-inch planer with the lathe, making a firm of Lathe, Planer & Co. The peculiar thing about these difficult jobs is that they always seem the hardest to do when they are first presented. In fact, all through our life the time when there seems to be the largest lion in the path it turns out to be only a stuffed one, and we found the large ell job one of this kind. We first cleared off the table of our 56-inch planer, placed one of the ells on it and measured the hight from base to center. We also set the head stock of our large lathe on the table, and found how much blocking up was required to raise the center up to the center of the ell. This we also did with the tail stock. Our next move was to get out blocks of cast iron to fill under, so as to have both centers exactly the same hight, in order to face the ell square. This will be readily understood by referring to the sketch.

We then placed one of the ells over the tail stock, and after setting square, clamped it fast to the planer table. While this was going on we cast an iron bar, about 4 feet long and 10 inches in diameter, with a cross through the center core, to make it rigid. After reaming liberal centers in the bar, we turned one end to fit a facing arm used for cylinders. We then clamped the arm part to the bar, and with a good strong driver on the other end we placed the whole arrangement on the centers of the head and tail stocks, and were ready for facing, except the power. As



FACING A LARGE ELBOW.

we had only one diameter to face, we required only one speed for the cone pulley. This we arranged by placing a single pulley on the line shaft and driving direct to the head stock. To feed the tool out in facing, we arranged a star feed and bracket for the facing arm feed screw, as shown. This device answered every purpose, and the ells will last just as long as if they had been finished in a mill that cost $10,000. H. S. BROWN.

Easton, Pa.

A Parallel Motion Straight-Edge for the Drawing Board.

Editor American Machinist:

Noticing in a recent issue the drawings and description of a combination drawing board and straight-edge has called to my mind a similar board, which, while not new, I think more simple. Referring to the sketches, Fig. 1 shows a board and straight-edge ready for use. For an example we will take a board 30 x 38 inches, which should be ⅞ inch thick and grooved as per dotted lines. The diagonal grooves are cut in the surface of the back, while the grooves parallel to the sides are cut in the edges of the board. Battens should then be screwed across the back. Next slot at the corners so that the pulleys, Fig. 4, can be let in, these being held in place by the screws, Fig. 5, which are put in from the back side of the board. A straight-edge is procured about 3 inches longer than the board, and a slot cut in either end, as at *B* and *C*, Fig. 1, which are to receive the clamps (Figs. 2 and 3) shown fastened to the straight-edge.

Now, take some good cord (grass or linen preferred), and thread it around the pulleys *F*, as indicated by the arrows of the dot and dash line, the starting end being passed around the groove of the nut *H*, Fig. 3, and into the slot *D*. The finishing end is passed around the groove of nut *H* and into slot *E* in like manner, a knot being tied in the ends to keep the string in place. The block *L*, in which are shown the two slots *D* and *E*, is loose on the screw *J*, the end of the screw being headed over as shown. The object of thus fastening the string to the straight-edge is to allow tightening or slackening the tension on the string by turning the screw *J*, this fastening one end of the straight-edge to the string; the other end is fastened by the clamp Fig. 2 in the slot *K*.

Hartford, Conn. D. W. Sowers.

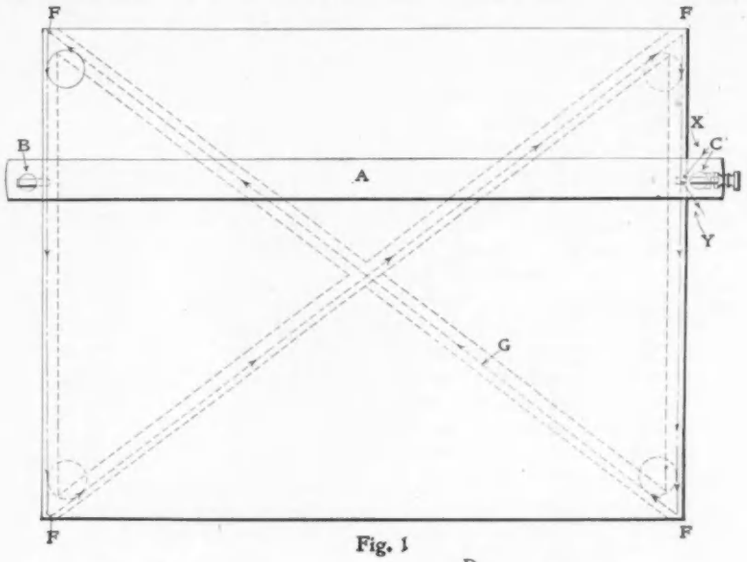


Fig. 1

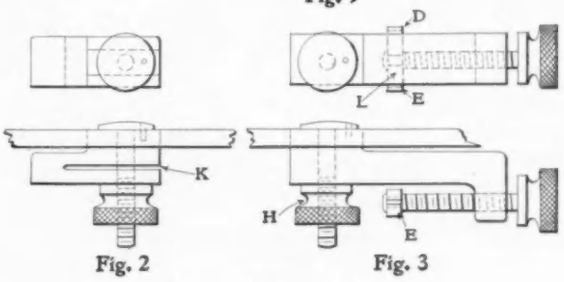


Fig. 2 Fig. 3

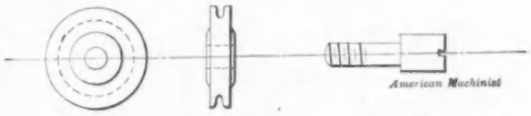


Fig. 4 Fig. 5

DRAWING BOARD AND PARALLEL RULER.

"The Message to Garcia"—Some Causes of Incompetency.

Editor American Machinist:

In the "American Machinist," September 21, Mr. Ray H. Denby hits the nail on the head when says that the reason so many employees give too little thought to their work is due to the fact that they are started wrong when boys. Boys who begin work under proper supervision should develop into thorough mechanics, or else they should be weeded out. Working under a foreman who is careless in his oversight or injudicious in his selection of work, they are likely to grow into those thoughtless men of whom we already have too many. I asked a machinist the other day if certain special tools—under discussion in the office at the time—would not be of benefit to him in his work. He said that he didn't know, had never thought about it; in fact, never thought nowadays, anyway. The reason for this was that when a boy he had worked under a man who never allowed his men to think; at least, never allowed them to put their ideas into execution. Not a nice kind of foreman that, but there are others of the same class, as many of us have at some time discovered.

I cannot entirely agree with Mr. Denby, however, in his idea that a man trained in the home shop makes a more capable foreman than an outsider. If the shop is engaged in the manufacture of some small specialty, and that only, very likely the home trained man would be the best. But most men obtaining situations as foremen have had a broad experience as journeymen, and have been successively under the direction of many men and have learned much of the systems and methods of many works. It would seem that a man of this experience and knowledge would see many of the shortcomings of any shop which he entered as foreman, and would be able to apply to advantage the experience gained in other shops. His experience under various foremen would be of especial value in his task of properly handling the men. The good and the bad qualities of his former superiors are stamped upon his mind, and he realizes that the qualities that have made other men successful in supervision will be equally valuable in his own case.

One of a firm of machine builders said a few days ago in speaking of his foreman: "So and so is all right, and a nice fellow, but he knows to-day just what we taught him as an apprentice years ago, and it never occurs to him that there may be methods at this time far ahead of those he has always followed." This is one of many instances where an outside experience would have been of the greatest value both to the foreman and to his employer. That a large proportion of the boys growing up under this foreman's supervision are becoming thoughtless and unprogressive workmen is certain.

There are too many shops where the "sufficient unto ourselves" idea prevails, and where the man trained outside is not wanted. I know a manufacturing concern whose history goes back many years. They trained their own men, and their foremen have been men who gained their entire experience in their shop. Former methods and systems have been handed down from one man to the next, and practically no new ideas have been introduced in either office or shop. Old-fashioned methods and appliances, and old-fashioned management, in the office as well as in the shop, have brought this concern almost to a standstill. And at this time,

when the machinery business in general is so good, these people wonder why they cannot successfully compete with concerns equipped with modern tools and under the management of men of modern ideas and of broad experience, gained in various places. Home-made management is often too limited in its knowledge of men and methods.

RAUNALT F. KEYS.

Parallel Ruler Attachments.

Editor American Machinist:

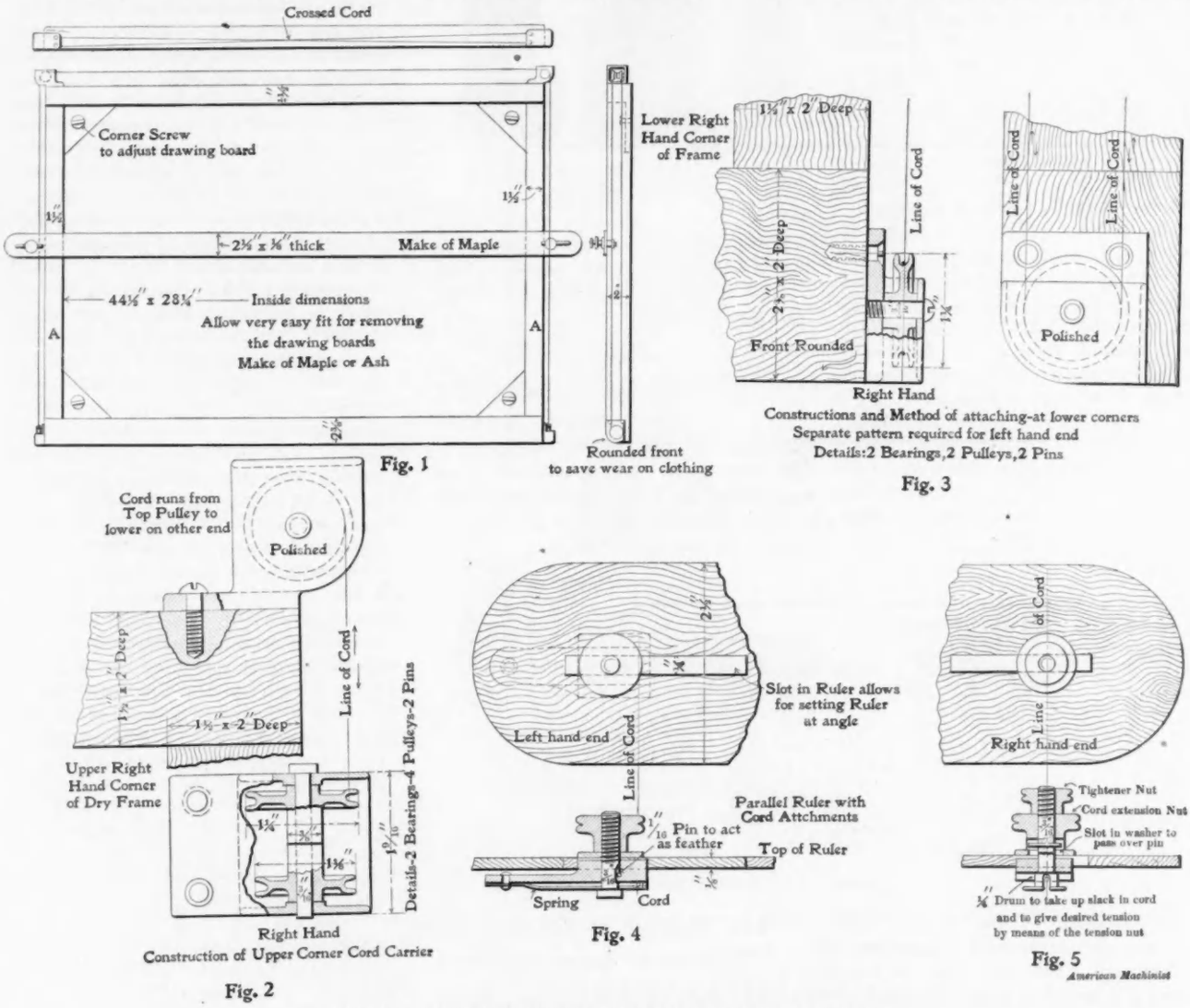
Reading with interest the article entitled "A Parallel Ruler Attachment for the Drawing Board," in your issue of September 21, I am led to offer, in this and the accompanying sketches, what may prove of interest to your many draftsman readers, and probably lead to the abandonment of their T-squares. I think the parallel ruler, once tried, will prove itself of real merit, a convenience and a time-saver.

Fig. 1 shows the general arrangement of the drawing-board frame and ruler, some twenty of which are now in use in the drafting department of the Niles Tool Works Company. They are made, as are also the tilting tables on which they rest, by a local firm to the order of, and per blueprints furnished them by the Niles Works. Blueprints of both have been given, and sometimes sent by request, to many engineering visitors.

The arrangement here shown is in many respects different from that which you describe and illustrate in the article referred to, since it is designed as a frame into which one of any number of extra drawing boards may be placed, thus allowing of unfinished work being set aside and taken up again. For instance, partly finished constructions are set aside to allow work on details to proceed. In many instances one draftsman will have four such boards in use, but only one frame.

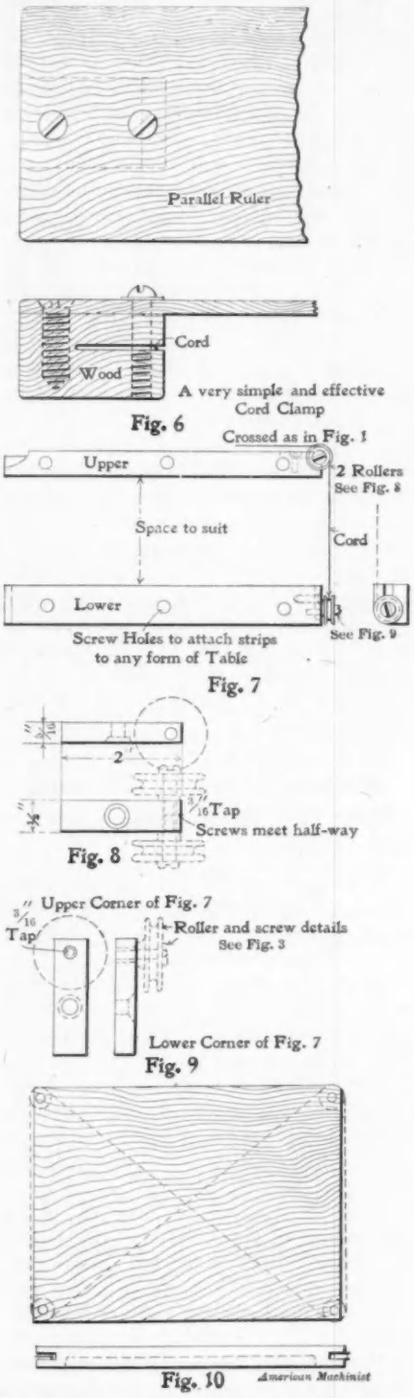
Crane's bond paper, No. 18, size 27x40, damped and stretched on the boards, is used entirely for detail work, display, foundation, and many of the construction drawings. Blueprinting is done directly from them, no effort being required to preserve the pencilled originals, as is customary when tracing cloth is used. The bond paper is transparent enough to allow an ink drawing to be easily seen through it, and, because of this, it can often be used when tracing a drawing in which a few changes (as is so often the case) are required. This is found to be far more satisfactory than trying to trace over an old pencilled original. The bond paper is very often used in detail work without the stretching process before mentioned; some even prefer it that way, as the surface of the paper is then undisturbed.

A somewhat unpleasant and expensive operation to have the draftsmen, as their drawings are completed and cut off, take their "next" for sponge and mucilage and put on one or two stretches? Yes, so it was; but a short time ago I had a special dustproof cupboard made, provided with guide strips above and below, into which some twenty boards are placed on end for drying, and are in this way ready for use when required. These are now put on by the office boy, and are usually very well done.


Crossed Cord
Corner Screw to adjust drawing board
2½" x ⅜" thick
Make of Maple
44½" x 28¼" Inside dimensions
Allow very easy fit for removing the drawing boards
Make of Maple or Ash
Rounded front to save wear on clothing
Fig. 1
Lower Right Hand Corner of Frame
1½" x 2" Deep
Line of Cord
2½" x 2" Deep
Front Rounded
Right Hand
Constructions and Method of attaching-at lower corners
Separate pattern required for left hand end
Details:2 Bearings,2 Pulleys,2 Pins
Fig. 3
Cord runs from Top Pulley to lower on other end
Polished
1½" x 2" Deep
Upper Right Hand Corner of Dry Frame
Details-2 Bearings-4 Pulleys-2 Pins
Right Hand
Construction of Upper Corner Cord Carrier
Fig. 2
Slot in Ruler allows for setting Ruler at angle
Left hand end
Pin to act as feather
Parallel Ruler with Cord Attchments
Top of Ruler
Spring
Cord
Fig. 4
Right hand end
Tightener Nut
Cord extension Nut
Slot in washer to pass over pin
¼" Drum to take up slack in cord and to give desired tension by means of the tension nut
Fig. 5
American Machinist

PARALLEL RULER ATTACHMENTS FOR DRAWING BOARDS OR FRAMES.

Figs. 2 and 3 show enlarged views giving clearly the construction of a six-pulley arrangement, one at the lower and two at the upper corners. This was designed a few years ago by Mr. John B. Crocker, and applied, not only to new frames, but, owing to their easy running qualities, they have replaced the older method of eight pulleys, where the cord (using linen fishing line; about 5 yards for a cent) crossed



DETAILS OF PARALLEL RULER ATTACHMENTS.

in the middle, under the board in the frame, in a most inconvenient manner for repairing, instead of, as in Fig. 1, a double line at each end *A A*, and crossed on the outside of the upper bar of the frame, the cord being always in view and easily repaired.

Figs. 4 and 5 illustrate the parallel ruler and its attachments, also designed by Mr. Crocker; Fig. 4 for gripping, and Fig. 5 for adjusting the desired tension. The slots are for angular adjustment, which, by the way, is so seldom used—not once in years. This frame is very neat in appearance, simple to make and operate, clear of any obstruction when the work is being done—in all, a very light, easy-running parallel ruler. It was designed for draftsmen by one of many years' experience, who is known personally by many of your readers in almost all the large cities of this country; and I feel sure that all will hope for his speedy and complete recovery from a long and trying illness to a continued usefulness in engineering work.

Fig. 7 shows a very simple construction that I applied in an emergency case a few weeks ago, when two additional frames were required. As seen, the sides *A A* of Fig. 1 were omitted; the upper and lower strips (made in the pattern shop, of pine) were permanently attached by screws to the table. The corners, shown in Figs. 8 and 9, were easily constructed from a number of discarded cord pulleys on hand. The other details (brass pieces, 5-16x½x2 inches) were drilled and tapped as shown, and let into the corners. Not having the details of Figs. 4 and 5 on hand, I devised the method shown in Fig. 6, which, by the way, is just good enough. A screwdriver is used to tighten the cord in the slot, and, of course, the angular adjustment was omitted. The tension is taken up in the slip-knot in the cord. Altogether, it is very effective, easy to construct, and the factor of cost is reduced to a minimum.

Fig. 10 is an application of four pulleys, held one in each corner, set just low enough to allow the cord to cross under the board. Several of these were in use a number of years ago in the drawing office of the then Gordon Steam Pump Company, the ruler attachments being a modification of Figs. 4 and 5.

In conclusion, I might say that to any of your readers desiring it, a blueprint of the brass details of Figs. 2, 3, 4, 5 will be sent on application.

WM. PILTON,
Chief Draftsman Niles Tool Works.
Hamilton, Ohio.

Cyanide and Prussiate of Potash in Case-Hardening.

Editor American Machinist:

For machine steel plates or dies having engraved or ornamental work upon them, and which are required to be polished after hardening, the best substance, in the writer's experience, to be used for case hardening is cyanide of potassium, chemically pure. This gives far better results than prussiate of potash or commercial cyanide of potassium, as the carbon of the C. P. grade combines more freely with the steel. A compound composed of 1 part potassium bichlorate, 1 part prussiate of potash and 4 parts of common salt works very nearly as well as the potassium cyanide, and is very much cheaper.

The object may be heated and the "cyanide" rubbed upon its surface in the form of a lump. By heating and coating the surface alternately several times, the thickness of the skin will be increased and the steel will be hardened deeper.

If it is desired to have the hardened steel as free as possible of puckered marks, care must be taken to allow as small an amount as possible of air to strike it while it is hot, therefore, in the case of plates, the plates may be heated until just at the point of turning red, when some powdered "cyanide" may be strewn over the surface and the plate heated further, until the proper degree of redness is reached, and then dipped into water. The "cyanide" will thus gradually melt and cover the surface of the plate with a film which will prevent the air from striking it. Care must also be taken, as in ordinary hardening, that there is body enough to the fire, so that no cold air from the blower (if blower is used) strikes direct upon the plate. The scale and scum which are on the plate after hardening may readily be removed by warming the plate slightly and then covering it with a solution made up of 1 part commercial muriatic acid and 1 part water (soft water is preferable to hard water) on it. The plate should then be thoroughly washed and oiled, as any acid adhering to it would cause it to rust.

In case hardening small pieces a pot may be used to hold the molten "cyanide." A number of pieces may be put at one time into baskets made of iron wire netting. Galvanized baskets, or those which are soldered at the joints, should not be used. The best results are obtained by keeping the molten mass at boiling point. At any lower temperature the "cyanide" does not penetrate as deep, and at any higher temperature the "cyanide" simply burns away without doing any greater effective work. The work should be allowed to remain submerged in the boiling "cyanide" for from 5 to 10 minutes, then dipped, first, into water, then into the acid solution, and lastly washed and oiled. This method of hardening small pieces leaves them scaleless, without pucker marks and perfectly clean and white, and they very readily take a fine polish. With the compound the treatment is the same as that just described.

EDWARD J. KUNZE.

[Our readers should remember that cyanide of potassium is a violent poison, and use it with great care.—Ed.]

The Slide Rule for Computing Gears for Screw Cutting.

Editor American Machinist:

The article by Mr. Morris Fulton in the "American Machinist" of October 12 tempts me to give my way of selecting compound gears for thread cutting. I can

best show it by an example, and I will take the one used by Mr. Fulton. Let it be required to select gears to cut thirty threads per inch with a lathe having the following gears: 24, 32, 36, 40, 48, 56, 60, 60, 64, 66, 69, 72, 78, 80, 84, 96, 120, a four-thread lead screw, and the stud having the same speed as the lathe.

The velocity ratio between the spindle and screw is to be 30 to 4. I first find the gears required, if simple gearing is used, and then reduce this by some compound on the intermediate stud that will give gears that are to be found on the list. If 24 be taken as the gear on the stud, the gear required on the screw for simple gearing would be 180, as seen from the proportion, 4 : 30 :: 24 : 180, and 180 and 24 would cut the thread; but 180 is not on our list. If we put in a 2 to 1 intermediate, keeping the 24 gear, we would require 90 on the screw. If we use a 2 to 3 intermediate, we would require 120. A 2 to 5 intermediate would give 72 on the screw. In this way it is a short job to select gears that are on the list. If we take the 2 to 3 intermediate and 24 and 120 on stud and screw, we can use any two gears for the compound which will have the ratio 2 to 3, such as 40 and 60, 48 and 72, 56 and 84, using the pair that makes the best connection. This may be no better, but to me it is easier than the way used by Mr. Fulton.

The slide rule is the ideal device for solving gear problems. Let us suppose we have the above lathe and gears, and are required to cut the 11½ pipe thread, and find, as is usual, that the required gears are not tabulated on the gear index plate fastened to the lathe. The ratio is 4 to 11½; setting these numbers together on the slide and rule, 4 on the C scale and 11.5 on the D scale, we have two series of numbers, any two of which, if found together, are in the ratio of 4 to 11.5. So, looking along C, the first number found which corresponds to our gear list is 36. As this is not over a number which is found on our list we pass it. The next number on our list is 40. Under 40 on C we find 111.5, which, of course, will not do. The next number, 48 taken on C, carries us above 120, our largest gear, so we must look below 36; 32 and 24 on C are off the scale on D, so we place the runner at the right-hand index of C, and move the slide till the left index comes to the runner. We then have the left end of C on the scale D, and the same ratio as before. Looking at 32 on C, below it on D we find 92, which is not on our list; 24 on C is over 69 on D, which shows that 24 and 69 are the only two gears which will cut the 11½ thread, using simple gearing. This is a case that comes out exactly, but we often want the nearest approximation, which is very quickly found as above.

Suppose we wish to know how near we can cut to 5 millimeters pitch with the above lathe.

Anyone can put on the back of the rule a lot of gage points suited to his particular work by the use of a strip of paper, India ink (water proof), glue and white shellac, in the order named. The shellac will keep the paper from being soiled by use.

From the back of my rule I find the ratio of centimeters to inches is 26 to 66. Setting the rule with these numbers together, we find that 1 centimeter equals .394 inch, and 5 millimeters equal .197 inch. Now the problem is to cut a thread .197-inch pitch. The required ratio will be .197 to .25. Setting these numbers together, we look along C scale to 24, the first gear on the list. Below we find 30.2, under 32 we find 40.6, under 48, 61. Taking the gears in their order on C, we see at a glance the gear required on D. Under 66 we find 83.7, which is very close to 84, which is in our list. To find out just what 66 and 84 will cut, solve the proportion 84 : 66 :: .25 : (.1965) by the slide rule. This is close enough to the required thread for ordinary work on short screws.

This may be thought of little use to the machinist, but many that are trying to improve themselves by reading and courses in the evening or correspondence schools will find the slide rule a profitable subject, and one that is quite easy to master. Anyone reading Mr. F. A. Halsey's articles in the "American Machinist" of 1896 can soon, by following the instructions, become reasonably proficient in the most used operations. I prefer the C and D scales for ordinary multiplication and division, though this is to a large extent due to habit.

J. H. Gill.

University of Minnesota.

Some Wheel Boring Suggestions and Experience.

Editor American Machinist:

I think that if the job had been mine of reboring a flywheel, as described in the "American Machinist" of October 26, I would have got along without having a bar cast. I think I could have found everything needed around that machine shop. Years ago, we bored a great many "spiders," as we called them, or centers for wood pulleys, all the way from 3½ to 12 feet in diameter, and we had no large lathe or boring mill either. We bolted cast-iron plates or "clamps" across the hub, blocking them up 2 or 3 inches above, or away from, the hub. These clamps had bushings fitting the boring bar and adjusted by set screws, usually four of them in each clamp. The boring bar passed through the bushings and was centered by tramming, the set screws providing a very easy way of doing this. The whole arrangement was then placed under a suspended drill press, or put into a lathe, with one leg of the spider going between the lathe shears and into a hole cut through the floor.

Now, in the case in question I do not suppose I would have found a pair of suitable clamps about the shop. Then I would have bolted a timber on each side of the hub, and on the face of them an ordinary flat box or pillow block, or, lacking them, wooden boxes. To center the bar (which would be a piece of ordinary shaft from 3 to 4 inches in diameter) I would make bushings turned to fit the bore of the wheel and bored to fit the bar, then broken or cut in halves for convenience in removing. If cast iron could not be found that would make these bushings, hard wood would answer the purpose. A slot would be cut through the bar and the cutter of, say, ⅜x1¼-inch steel, keyed in. For the feed I would take a piece of 1-inch round iron or steel 4 or 5 inches longer than the depth of the hub, cut a fine thread, say 14 pitch, nearly the entire length, turn one end to ¾ inch diameter by 1 inch long, thread it and screw it into the lower end of the bar. The nut would be two pieces of hard wood clamped over the screw, which would readily form a sufficient thread in them. There would not need to be anyone under the wheel to keep the feed going. The operation of the rig will be understood by the "boys" without further explanation, I think.

I do not understand why the chips and fine iron dust didn't bother Mr. Brown. I know I would expect unlimited trouble from that source in using the rig described. I always tied a cloth tightly around the bar (when used vertically), just above the lower clamp, and whenever that became loosened, as it sometimes would, I found it out very soon by the bar "cutting" in its bearing—and oil only made it worse.

E. S. Newton.

Rubber Stamps for Lettering Drawings.

Editor American Machinist:

Some time ago I wrote you in regard to using a rubber stamp and a mixture of India ink for the purpose of lettering drawings and tracings.

Since that time I have experimented more at length, and we have now adopted in this office a rubber stamp known as the "air cushion stamp," which consists of a hollow rubber base on which the rubber type is imposed, so that no matter how the stamp is put down upon the surface of the paper, the enclosed air forces it to bear evenly all over the surface.

With this stamp we use an orange chrome ink of the consistency that is used on rubber stamp pads, and in the same manner that the self-inking stamp pads are used, and find the results very satisfactory.

I send you an imprint of the stamp on a piece of bond paper such as we use for drawings, and also a blueprint of the stamp, which will show you the practical result.

This stamp works even better on tracing paper and tracing cloth than on the bond paper.

Wm. O Webber.

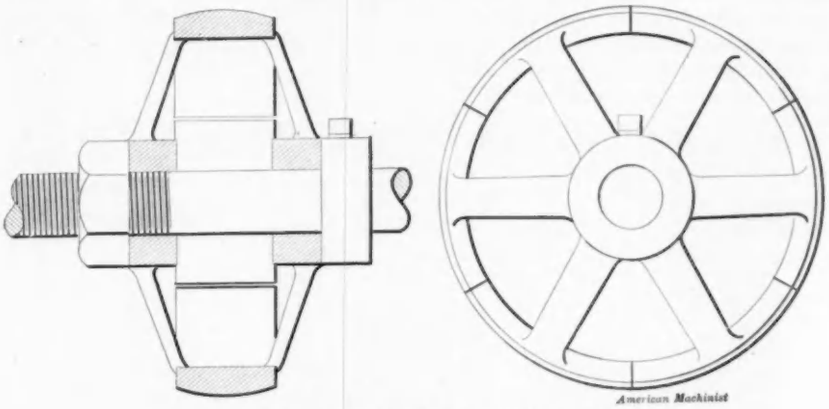
[The impression sent is quite satisfac-

tory, but obviously cannot be reproduced so as to show its quality. It contains such lettering as goes on all drawings produced in a given office, with dotted lines for distinctive entries.—Ed.]

A New Expansion Pulley.

Editor American Machinist:

The accompanying sketch is that of an expansion pulley designed by Mr. Florence, master mechanic of the Newnan Cotton Mills. This special pulley was designed for a yarn winding machine, and was to regulate the speed of the traverse which guided the lay of the yarn on the ball. It was desirous to lay the yarn side by side with no space between, so fine yarns had to be laid closer than coarse yarns. It was thus necessary to change the speed of the traverse, and it was found that the change from the finest to the coarsest yarn to be wound only required a variation in diameter of a 6-inch pulley of less than five one-hundredths of an inch, so it was impossible to get change gears to make the difference, and cone pulleys would not give satisfactory results; so this very simple, and yet very efficient, pulley was designed.



AN EXPANSIBLE PULLEY FOR MINUTE CHANGES OF SPEED.

It will be seen from the sketch that the pulley consists of two sets of spokes connected to a common rim, but to different hubs. The rim is cut midway between each set of spokes, so that when the two hubs are compressed together by means of the nut on the shaft upon which they are mounted the rim will be forced out. The spring in cast iron was found to be sufficient to give ample variation in the size of the pulley. JIB.

Cutters and Cutter Plates.

Editor American Machinist:

Probably few of your readers, except those engaged in the jewelry trade, will recognize the above title as having any connection with punch and die work; yet it is the universal name by which that class of tools is known by those engaged in making or using them. The number of dies used and the amount of tool making required in the jewelry business are very large, and many ways have been devised to reduce the cost of the tools and still secure the desired results, some of which I will try and give you for the benefit of those of your readers who are "kicking" over the cost of their die work.

The cutters, as the punches are called, are, in nearly every case, made with round shanks, ⅜ to ⅝ inch diameter, and used soft, a tempered punch being a rare tool to find in a jewelry shop. The cutter plates or dies are made in the usual manner, except that they are generally made of very thin steel, ¼ to ½ inch thick, and given an excessive clearance. This is allowable, as stock silver or gold plate is very easy to cut and gives but little wear on the tools. I have often seen dies that had been in use for a year or more that still had the color from the tempering process left on the face. The dies are milled out on the inverted milling machine (every jewelry shop of any size has one of these machines, and, in fact, every die shop should have one), using a very small cutter, often under 1-16 inch diameter at the point, and leaving very little to file.

The filing is all done vertically, and if my brother die makers will only give it a good trial and get used to it, they will always prefer to finish a die in that manner. Grasp the file, letting the thumb come well up on the body of the file, and have the left forefinger touch the lower part of the vise to serve as a guide to ensure the file moving in a vertical line. Work on the side of the die farthest from you, and after a short trial you will find it a vast improvement over filing in the vise in the usual way.

The punches are often built up as shown by the sketch, Fig. 1, the working part being got out of 3-16 or ¼-inch steel, and then hard-soldered on to the shank. "What a botch of a job!" I hear some of your readers say; and I said so, too, until I used tools made in this manner; and they are all right, provided you are going to cut silver or gold plate, or even brass stock. The cost is about one-half that of a solid punch, and when the thin steel is worn down a new piece can be quickly got out and soldered on to the same shank. As I said before, although many of the tools are made in this way, yet some of the finest and most expensive tools I have ever seen, as well as some of the best toolmakers, were in the jeweler's shop.

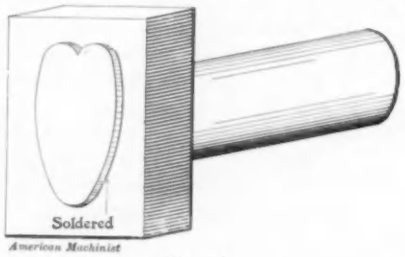
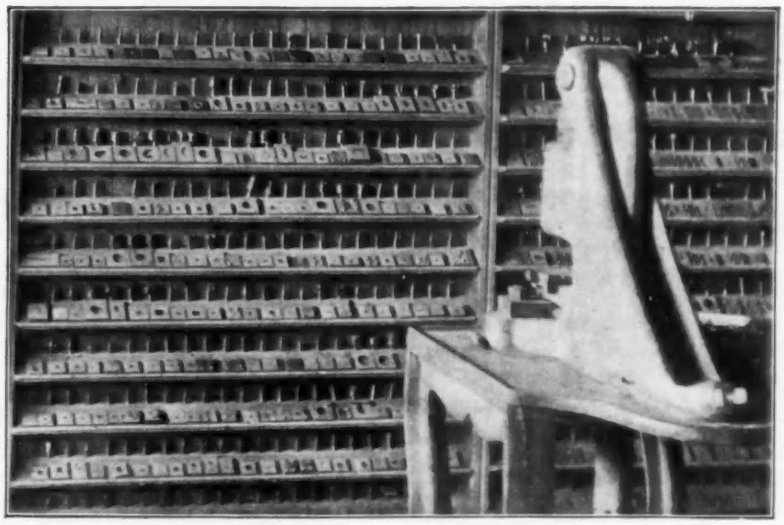


Fig. 1

A "BUILT UP" PUNCH FOR JEWELERS' WORK.

The large number of dies in use necessitates a system of some kind to keep track of them. One way is to put them in racks (a small portion of one of them being shown in the half-tone), with the



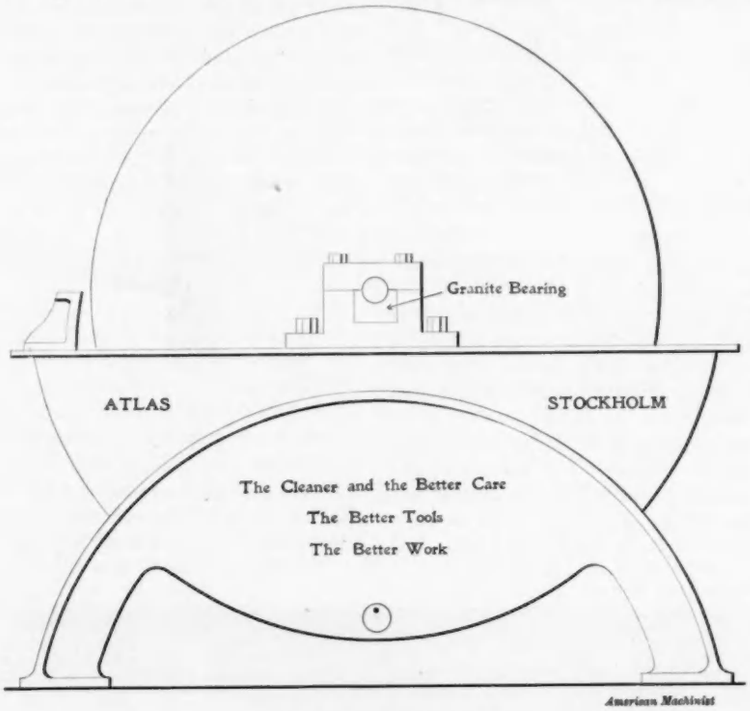
A BIT OF ONE OF THE PUNCH AND DIE RACKS IN A JEWELRY FACTORY.

plungers all upside down, so that they can be quickly recognized and picked up. Another, and better, way is to keep each set in a covered box, labeled with a sample from each die, and the name of the brooch, locket or whatever class of work it may be used for. Although the tools spoken of are all simple, single-action tools, yet the use of double-action presses and tools is universal on the cheaper grades of work, and even, to some extent, on the gold and silver goods. J. L. LUCAS.

A Grindstone Frame in a Swedish Shop.

Editor American Machinist:

In strolling through the Atlas Works, Stockholm, where one sees something new or unexpected at every ten steps, I came across a grindstone frame, remarkable for



A SWEDISH GRINDSTONE.

two things: first, that the bearings were granite blocks set in ordinary mortises, and, second, that it bore an inscription in Swedish, which I translate thus: "The cleaner and the better care, the better tools, the better work," a logical sequence which no one can dispute. Mr. Jacobi claimed for the granite bearings a maximum of endurance with a minimum wearing effect on the arbor. The design of the frame and trough is one of elegant simplicity, as may be seen from the annexed sketch. I think that the too much despised grindstone would be more appreciated if its frame bore, as a regular thing, some such motto.

Apropos of mottoes on frames, let us remember one of Prof. Sweet's, which he evolved in the seventies for an engine frame: "Keep your monkey-wrench off this engine!" G.

Computing Gears for Screw Cutting.

Editor American Machinist:

As Mr. Morris Fulton says, there is nothing that so interests young machinists as the figuring out of gears for cutting odd threads, and I may add, there is nothing over which they waste so much time. This is often true of the older hand, too. In the shop where I learned my trade there was no lathe that had the gears for 11½ threads on the index plate. By the combined efforts of the foreman and the three lathe hands, gears were found which almost (lacking three teeth) cut it, and they let it go at that. I afterwards found that the proper gears were in the shop all the time.

I wish to give my method to the readers of the "American Machinist," as it seems to me simpler than any I have seen, though of course the fundamental principle is the same. The problem is to find gears that give the spindle the same velocity ratio to the screw as the thread on the screw is to the thread to be cut. Let us use the same screw and gears that Mr. Fulton used, a four-pitched screw, and gears 24, 32, 36, 40, 48, 56, 60, 60, 64, 66, 69, 73, 78, 80, 84, 96, 120, and solve the problem he gave by our method, which is as follows:

Write the pitch of the lead screw and the pitch of the thread to be cut in the form of a fraction, then multiply both terms by any number, and if no gears with that number of teeth can be found, then the thread can't be cut.

For example: To find the gears for cutting 9 threads, the pitch of the lead screw being 4:

$\frac{4}{9} \times \frac{5}{5} = \frac{20}{45}$ $\quad$ $\frac{4}{9} \times \frac{10}{10} = \frac{40}{90}$

$\frac{4}{9} \times \frac{6}{6} = \frac{24}{54}$ $\quad$ $\frac{4}{9} \times \frac{11}{11} = \frac{44}{99}$

$\frac{4}{9} \times \frac{7}{7} = \frac{28}{63}$ $\quad$ $\frac{4}{9} \times \frac{12}{12} = \frac{48}{108}$

$\frac{4}{9} \times \frac{8}{8} = \frac{32}{72}$ $\quad$ $\frac{4}{9} \times \frac{13}{13} = \frac{52}{117}$

$\frac{4}{9} \times \frac{9}{9} = \frac{36}{81}$

The above list contains all the gears between 20 and 117 that will cut 9 threads, the numerator being the driver and the denominator the driven gear. It is not necessary to figure all the gears; a mere inspection will usually determine what multiplier to use, and the operation is entirely mental.

The greatest value of the method is in figuring compound gears, as in nearly all cases one term or the other of the fraction can be factored, then the problem is the same as for simple gearing. For example, find the gears to cut 30 threads; the operation is thus:

$$\frac{4}{80} = \frac{2}{15} = \frac{2}{5} \times \frac{1}{3}$$

$$\left.\begin{matrix} \frac{2}{5} \times \frac{12}{12} = \frac{24}{60} \\ \frac{2}{5} \times \frac{16}{16} = \frac{32}{80} \\ \frac{2}{5} \times \frac{24}{24} = \frac{48}{120} \end{matrix}\right\} \quad \left\{\begin{matrix} \frac{1}{3} \times \frac{24}{24} = \frac{24}{72} \\ \frac{1}{3} \times \frac{32}{32} = \frac{32}{96} \\ \frac{1}{3} \times \frac{40}{40} = \frac{40}{120} \end{matrix}\right.$$

Here, as before, the numerators of the resulting fractions are the drivers and the denominators are the driven gears, and either fraction, or driver and driven gear, in the first or left-hand portion may be used with either fraction of the right-hand portion. Thus the first fraction, $\frac{24}{60}$, may be used with the last fraction of the right-hand column, $\frac{40}{120}$; 24 and 40 then are the drivers and 60 and 120 are the driven gears. The list of gears gives seven sets or combinations of gears which would cut 30 threads. These examples are sufficient to show the method. J. JAY DUNN.

Shelby, Ohio.

Die Making—Blanking and Drawing Tools.

Editor American Machinist:

As with everything else, there is generally more than one method or practice in making blanking and drawing tools, otherwise commonly known among tool makers as double-acting press or cupping tools. I will submit a description and a shop sketch which will serve to illustrate a quick and successful way to make a set of blanking and drawing tools to be used in connection with a double-acting power press.

Referring to the accompanying sketch, *A* is the "outside" or blanking punch, *B* is the "inside" or drawing punch, and *D* is a half-sectional view of the die. In making these tools we use first quality tool steel (Crescent). The punch *A* is left soft, so that as it loses its size it can be upset and refitted into the die. The shank of the punch *A*, slightly tapering, is made to fit the punch holder of the press, and is held there by a strong set screw entering a flat spot filed on the shank. The drawing punch *B* is hardened and ground, and is held in the gate of the press by a "yoke" key at the shoulder *F*. The die *D* is "crowned" off on the top, which is done

only to facilitate the operation of grinding the cutting edge, which gets dull from constant use. The bottom or bearing surface of the die is recessed at *E*, which serves as a convenient place to mark the number of the tools. The die *D* should be hardened, ground and drawn to a light straw color. The inside or drawing part of the die should also be carefully lapped to size. The die is held in the die bed by means of a die holder plate, which holds it securely in place at the shoulder *S*. In making these tools we first make the punch *B*, then the punch *A*, and lastly the die *D*.

The diameter of the blank and the size of the punch *B* are both figured from the sample shell, and to obtain the size of the drawing part of the die we use the following rule: The diameter of the "draw" of the die is equal to the diameter of the drawing punch plus twice the thickness of the metal used; as, for example, the diameter of the drawing punch is .546 inch, and the thickness of No. 25 metal, B. and S. gage, is .018 inch; then $.546 + (.018 \times 2) = .582$, which is the diameter of the "draw" of the die. In making blanking and drawing tools for sheet metal they must be made accurately (micrometer measurements) to produce satisfactory results. We generally use the cam-actuated finger-motion feed in connection with our double-acting power presses.

Springfield, Mass. C. C. CANDRIAN.

Ottmar Mergenthaler.

Ottmar Mergenthaler must be regarded as second only to Guttenberg for his transforming touch upon the art preservative. The invention of Guttenberg was comprised in a single idea, and one easy enough to work out when once thought of, that of the use of movable type; while that of Mergenthaler, although also apparently easy to conceive, involved the invention and the construction, by tedious experiment and evolution, of one of the most ingenious and complicated machines that has ever been devised by man and brought to complete success. His invention has revolutionized the art of the printer, and has created a new line of construction for the machinist.

OTTMAR MERGENTHALER.

Ottmar Mergenthaler was born in Wurtemberg, Germany, May 10, 1854. His life work was practically done at the age of forty, the hopeless fight with consumption engrossing more and more of his time and strength and overwhelming him at the last. He was apprenticed to a watch and clock maker when fourteen years old. At the age of eighteen he came to the United States, and two years later was the leading workman in a shop in Washington, manufacturing electrical instruments and apparatus. This business was removed from Washington to Baltimore, and Mergenthaler went with it.

So far as appears, Mergenthaler first had his attention directed to typesetting and printing devices in 1876, when he was employed in attempts to perfect a "rotary lithographic" machine, the invention, as far as it had gone, of Charles Moore, from West Virginia. The general idea of the Moore machine was to produce by typewriting a print like that produced by printers' type, and to multiply the work so made by the lithographic process. A machine was produced which was generally satisfactory, but when it came to the final stage of the process, the lithographing, it was a hopeless failure. Out of the litho-

(*Continued on page 38.*)

Miscellaneous Wants.

Advertisements will be inserted under this head at 25 cents a line, each insertion. Copy should be sent to reach us not later than Saturday morning for the ensuing week's issue. Answers addressed to our care will be forwarded.

Gear Wheels, gear cutting. Grant; see p. 16.

Caliper cat. free. E. G. Smith, Columbia, Pa.

Forming lathes. Mer.Mach.T.Co., Meriden, Ct.

Punches & dies. Wal.M.Wks., Waltham, Mass.

Rawhide, fibre and hard rubber gears. The Arthur Co. (See page 8.)

Construction and repair of Commutators, 50c. L. C. Sharp, Omaha, Neb.

Light and fine mach'y to order; models and elec. work specialty. E. O. Chase, Newark, N. J.

Book "Dies and Diemaking," $1, post paid. J.L.Lucas, Bridgeport, Ct. Send for index sheet.

Selden Packing for Stuffing box, with or without rubber core. Randolph Brandt, 38 Cortlandt st., New York.

For Sale—Two geared Ferracute presses, 62 in. between uprights; little used, and in good condition. Address W. H. Mullins, Salem, Ohio.

Threads and gears; easy rules to cut any thread possible to be cut in the lathe, without algebra, sent to any address for 25c. by G. W. Dixon, Spring Lake, Mich.

For Sale—American Tool Co.'s screw machine, 18 in. swing, complete; used 6 months; will sell cheap or exchange for 24 in. lathe. Address Box 411, AMERICAN MACHINIST.

Engineers and firemen, send 2 cents for 24-page pamphlet containing list of questions asked by Examining Board of Engineers. Geo. A. Zeller, bookseller, St. Louis, Mo. Mention A. M.

For Sale—One 20 horse-power horizontal tubular boiler, with pumps, inspirator, heaters, etc., and one Armington & Simms 50 horse-power engine; all in first-class condition. Inquire Box 407, AMER. MACHINIST.

Institutions retiring from business having machine tools, brass and wood working machinery will find it to their interest to correspond with us. We purchase complete plants or handle them on com. C. C. Wormer Mach. Co., 55-59 Woodbridge st., W., Detroit, Mich.

An excellent chance for someone with a few thousand dollars to step into a modern machinery manufacturing plant, about one hour from New York city, that is making money; employing about 50 men; will be sold free of incumbrances and on easy terms; the owner wishing to retire on account of ill health. Address Box 420, AMER. MACHINIST.

(*Continued from page 37.*)

graphic rotary machine was evolved a rotary electrotypic system. Here characters were impressed into papier mache, and castings of type metal were then made by the usual stereotyping process. Experiments with this device were continued after Mr. Mergenthaler's withdrawal from it in 1879, but it was finally abandoned in 1884.

Mergenthaler went into business for himself in 1883, again considering the printing problem. He received financial aid from parties in Washington. A small machine was made which marked a great advance upon all previous attempts, but there was still an unsurmounted difficulty in the paper matrix, the speed at which the machine was to work precluding the possibility of drying the mold upon the type, as the conditions required. Only after this was struck the real keynote of the final linotype machine. To the inventor came the query: "Why can I not stamp matrices into my type bars and cast type metal into them in the same machine?" Two machines were built on this new principle, and one was tested in the summer of 1884. Soon after this test the National Typographic Company, of West Virginia, was formed, with a shop and offices in Baltimore, and Mr. Mergenthaler in control as sole judge of all mechanical questions. In February, 1885, the second machine with automatic justifier was exhibited in Washington before President Arthur, James G. Blaine and many others. Following this exhibition a banquet was given, and Mr. Mergenthaler spoke of his labors and of the value of the machine to the printer and the world, concluding his speech with these words:

"It is a great result, but, gentlemen of the board, to you it is due as much as to me. You have furnished the money, I only the ideas; and in thus enabling me to carry this invention to a successful end, you have honored yourselves and your country. I say you have honored your country, for everyone will know that this invention has been originated in the land which gave birth to the telegraph, the telephone, the Hoe press and the reaper. Everybody will know that it came from the United States, though comparatively few will know the name of the inventor."

Of the story of the successive improvements of the machine after this, and of its rapid adoption by the best printing offices of this land and abroad, and of the change and improvement it has wrought in the production of printed matter, it is quite unnecessary to speak. The story of the mechanical problems encountered and happily solved in the invention of the machine, as also those involved in its perfect, economical, rapid and extensive manufacture, would cover many pages, and not less interesting would be that of the financiering of the enterprise. The first dividend

(*Continued on page 39.*)

Wants.

Situation and Help Advertisements only inserted under this head. Rate 25 cents a line for each insertion. About six words make a line. No advertisements under two lines accepted, and no advertisements abbreviated. The cash and copy should be sent to reach us not later than Saturday morning for the ensuing week's issue. Answers addressed to our care will be forwarded. Applicants may specify names to which their replies are not to be forwarded; but replies will not be returned. If not forwarded they will be destroyed without notice. Original letters of recommendation or other papers of value should not be inclosed to unknown correspondents.

Situations Wanted.

Purchasing agent will change position. Address Box 402, AMERICAN MACHINIST.

Traveling (machinery) salesman; first class. Address Box 401, AMER. MACHINIST.

Advertising manager; thorough in machine tools. Address Box 403, AMER. MACHINIST.

Skilled toolmaker and draftsman wants change; 10 years tool-making, 5 drafting; New England preferred. Box 414, AM. MACH.

Party with machine shop and drafting room, general supervision of details and management of labor, desires a situation. Box 1429, Boston, Mass.

Wanted—Position as foreman machinist; 12 years' experience on engines, compressors and general machine shop work. Box 399, AMERICAN MACHINIST.

A toolmaker who has had experience in designing special tools, jigs and on experimental work, wants similar position. Box 404, AMERICAN MACHINIST.

Draftsman and designer of Corliss engines, air compressors, automatic machinery, etc., desires change; competent to take charge. Box 381, AMERICAN MACHINIST.

Situation wanted by a first-class mechanical draftsman and designer; 14 years' experience in Corliss valve engines and air compressors. Address Box 397, AMERICAN MACHINIST.

A graduate of Stevens Institute of Technology, with considerable experience as a draftsman, desires a position involving testing or outside work. Box 413, AMER. MACH.

Position wanted as factory manager; familiar with most economical methods and practice in foundries, machine shops and kindred departments; thoroughly practical and up to date. Box 412, AMERICAN MACHINIST.

Position wanted as draftsman, etc., by German; 15 years' experience as foreman and constructor of electro, tools, automatic, hydraulic, Corliss engines, automobiles, etc. Address E. Karler, 423 E. 80th st., New York.

Superintendent, at present in charge of a large machine shop, will be open for engagement December 1. Parties requiring the services of an up-to-date man in this line will not regret addressing Box 396, AMER. MACH.

Help Wanted.

Wanted—A first-class mech. draftsman. Inquire 115 Plymouth st., Jersey City, N. J.

Wanted, at Once—Three capable men for general machine work. Greenwood Bros. & Co., So. Gardner, Mass.

Machinists for vise work, good and steady men; state wages and experience. Niagara Machine & Tool Works, Buffalo, N. Y.

Wanted—First-class diemaker, familiar with sheet-metal work. Address Grand Rapids Hardware Company, Grand Rapids, Mich.

Wanted—Experienced sealer and adjuster weighing scales; state positions held and wages. Address "Scale," AMER. MACHINIST.

Wanted—Good draftsman for general machine designing; state experience and wages expected. Address "Connecticut," care AMERICAN MACHINIST.

Wanted—General manager for foundry employing about 75 molders; must be experienced and up-to-date man. Address Box 415, AMERICAN MACHINIST.

Wanted—Foundry foreman; chief work light and heavy power transmission; foundry equipped with air hoists and molding machines. Box 389, AMERICAN MACHINIST.

Wanted—Machinists, floor and lathe hands; must be strictly first-class men, sober and reliable; permanent position to good men. Address Robinson Machine Company, Monongahela, Pa.

Wanted—Two practical designers having had experience in designing shop tools and model work. Reply, addressing Box 416, AMERICAN MACHINIST, stating experience and wages expected.

Machinists wanted; a number of first-class men on high-speed marine engine work. Apply Gas Engine & Power Co. and Charles L. Seabury & Co., Consolidated, Morris Heights, New York City.

Wanted—A first-class foreman machine blacksmith, to take charge of forging department in large machine shop; state age, wages, nationality, experience and references. Box 419, AMERICAN MACHINIST.

Wanted—First-class operator for Gisholt lathe; one who has had experience in making and designing tools preferred; state fully experience, age and wages expected. Address Box 391, AMERICAN MACHINIST.

Machinists wanted; a few good lathe, planer and milling-machine hands, for steady work; location a short distance from New York. Write, stating ability and where previously worked, to Box 368, AMER. MACH.

We are enlarging our works, and will shortly require an increased number of skilled mechanics; we invite application from draftsmen, pattern makers, molders and machinists. Address the Westinghouse Machine Company, East Pittsburgh, Pa.

Wanted—Three good planer hands who can plane lathe and planer beds, etc.; also four good fitters on machine tools and two good draftsmen on machine tools; also lathe, planer and vise hands. Address Box 387, AMERICAN MACHINIST, and state wages wanted and experience.

Superintendent for large cycle works in England; must be a thorough mechanician and possess thorough knowedge of systematic cycle manufacturing and the handling of men; reply with full information as to former engagements and give references. Churchill, Leonard st., Finsbury, London.

Wanted—An experienced and capable advertising solicitor; one who is well acquainted with the large manufacturing industries in the engineering and mechanical trades of the country; also local ones for Pittsburgh, Boston, Cincinnati, St. Louis and other cities throughout the country; references. S. E. Hendricks Co., 61 Beekman st., New York.

Wanted—An assistant superintendent for machine shop and foundry manufacturing engines and work of like nature; must be a good draftsman and practical machinist; in answering, state age and experience, giving reference and salary expected; location is in Middle Atlantic States. Address Box 392, AMERICAN MACHINIST.

Wanted—An experienced milling machine operator to take charge of milling department in one of the best machine-tool shops in the country; must understand all kinds of milling-machine and gear-cutter work and know how to produce first-class work rapidly; a splendid opportunity for the right man; married man preferred. Write to Box 418, AMERICAN MACHINIST, stating age, experience and salary expected.

Wanted—An A1 lathe hand, with experience in handling men, to take charge of about 25 engine lathes to get the greatest possible product from the machines; must have had experience in shops building high-grade machine tools; none but strictly first-class men who are looking for a steady position need apply; shop new and up to date. Address, stating age, experience and salary expected, Box 417, AMERICAN MACHINIST.

Wanted—A young man with good education, as general foreman or assistant superintendent of a shop manufacturing high-grade machine tools; factory new and strictly up to date; only A1 men with experience in manufacturing machine tools and thoroughly familiar with modern machine-shop practice, need apply; must also know how to handle men to best advantage; a splendid opportunity for the right man; state age, experience (fully) and salary expected. Address Box 390, AMERICAN MACHINIST.

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for the manufacture of machine tools of precision requires immediately an engineer specialist, thoroughly up to date and understanding the manufacture of machines of precision according to the American system. The best references are necessary. Write to P. M., Brussels (North), Belgium.

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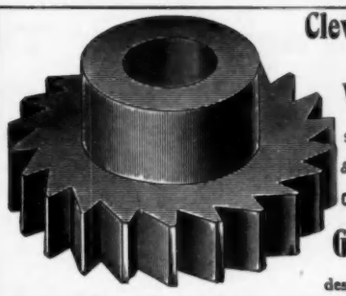

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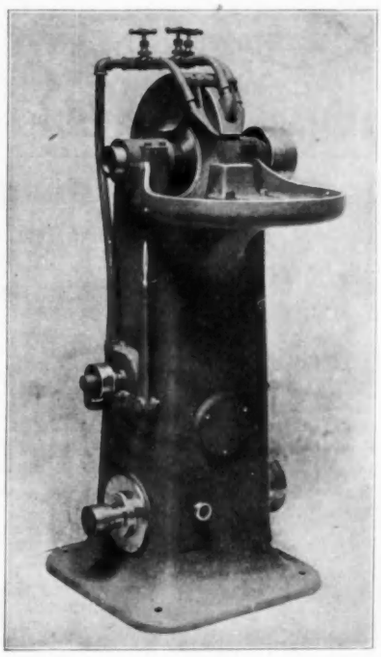

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(*Continued from page 38.*)

of the company was paid in the summer of 1894, the number of machines either sold or on lease at the close of the business year being nearly 1,500, and then increasing rapidly. The capital stock of the Mergenthaler Linotype Company is now $10,000,000, on which 20 per cent. is paid annually, the stock being now quoted at 206.

Mr. Mergenthaler, weakened by overwork, was stricken with pleurisy late in 1888. His life was then despaired of, but after a struggle of two months he recovered, although his physicians then expressed the fear that the attack had induced consumption. In 1894 the existence of pulmonary consumption was conceded. He, in the summer of that year, removed to the Blue Ridge Mountains, and later went to the Adirondacks, and was compelled to relinquish personal control of the Baltimore Linotype factory. His death, as previously announced, occurred on October 28.

Personal.

Mr. E. B. Hotchkiss, manager of the Brussels house of Adolphe Janssens, of Paris, is in this country on a business trip, and makes his headquarters at the Imperial Hotel, New York city.

Mr. George C. Davis, of Philadelphia, a graduate of the Worcester School of Technology and a member of the American Society of Mechanical Engineers, has accepted a position with the Sterlingworth Railway Supply Company, of Easton, Pa., as metallurgist.

Mr. H. O. Evans, recently connected with the Worthington Pump Company in an official capacity, and formerly connected with the Stanley G. Flagg Company, of Philadelphia, and the Crane Company, of Chicago, has been appointed superintendent of the malleable iron department of the Sterlingworth Railway Supply Company, of Easton, Pa., succeeding Mr. H. C. Duggan, resigned.

Inquiries for Machinery.

(113) Machinery for making lead-headed nails.

(114) Machinery for printing oilcloth.

Manufacturers.

Singer Manufacturing Company, Elizabeth, N. J., is to erect a new five-story brick factory.

Boston Gear Works, Boston, are to occupy new premises at the corner of Purchase and Pearl streets, Boston, where they will have better facilities for carrying on their business.

The Electric Storage Battery Company, Nineteenth street and Allegheny avenue, Philadelphia, will erect an addition to their factory reducing room, at same address. It will cost $7,000.

Okie, Duhring & Ziegler, 1420 Chestnut street, Philadelphia, Pa., have recently completed plans and specifications for a brick,

stone and iron-framed factory, to be built at Riverside, N. J., for the Riverside Metal Company.

The Philadelphia (Pa.) Engineering Works will have extensive additions made to its plant, embracing a one-story bridge shop, 120x50 feet, of brick and iron, with concrete foundations, and an extra addition of brick measuring 50x65 feet. It will cost $15,000.

A modernly appointed mill building is to be erected at Doylestown, Pa., by a newly formed company, of which Robert M. Yardley is president. The building will cost about $15,000 and contain latest improved special machinery, together with power apparatus.

Estimates are being taken in the office of Macey, Henderson & Co., Heed Building, Philadelphia, for an extension to the car shops of the Brill Car Company at West Philadelphia. It will be 45 feet long, of brick and iron, one story, with slag roofing, iron frame work, electric wiring, etc.

The Midvale Steel Works, Philadelphia, has been granted the right to run a special water pipe to the Schuylkill River, as an extension of its plant that will mean the employment of 2,000 additional hands will soon be made, and the city water supply will then be much less than is needed.

The American Iron & Steel Manufacturing Company, Lebanon, Pa., to-day purchased a strip of land one-half of a mile in length and one-third of a mile wide, lying between their eastern and central plants here. The purchase is said to have been prompted by the intention to erect a modern steel plant on the site.

At a meeting of the directors of the Utica Pipe Foundry Company held recently it was decided to erect a new foundry building for the manufacture of plumbers' castings. It will be a regular foundry building, 150 feet in length by about 70 feet in width and one story high. When running full handed the new foundry will give employment to from thirty-five to fifty men. The plant will cost about $25,000.

New Catalogs.

Howard Iron Works, Buffalo, N. Y., sends us copy of new catalog in which are illustrated and described pulleys, vises, hangers, clutches, also bolt-cutting and nut-tapping machines. At the end of the catalog some useful information in the way of tables is given. The catalog is standard size, 6x9 inches.

The Munson Company, of La Porte, Ind., sends us catalog in which are described and illustrated automobiles as made by that company. The construction and method of operation of the vehicles are gone into, and the catalog contains a number of illustrations of finished vehicles, together with views showing the mechanism. It is 5x7 inches.

August Mietz, of New York, sends us copy of catalog in which is illustrated and described the Mietz & Weiss engine, which may be operated by gas or kerosene. The various parts of this engine, such as the governor, ignitor, etc., are described. Illustrations showing these engines in actual use are also given. The catalog is standard size, 6x9 inches.

We have received from the Carborundum Company, Niagara Falls, N. Y., copy of small booklet entitled "The Basis of Manufacturing Economy." This contains a good deal of information regarding carborundum and its uses for grinding and polishing purposes, the facts concerning this substance being given in an interesting and entertaining way. The booklet is illustrated, and should prove of interest to those engaged in the operation of grinding machinery. It is 3¼x6 inches.

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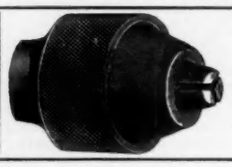

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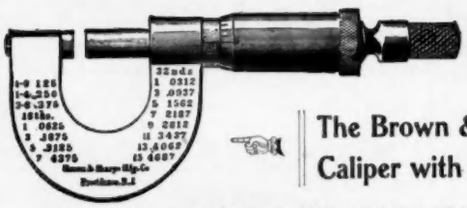

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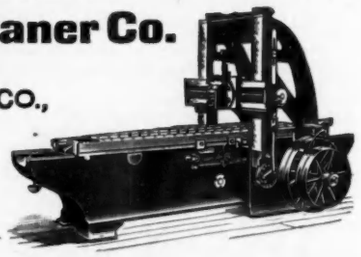

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